JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The Institution Technical Programme.

THE Council of the Institution of Gas Engineers have made their selection of the subjects to be submitted for discussion at the forthcoming meeting of the Institution; and it may, to the extent that the titles enable judgment, be pronounced a good one. Although, so far as the programme of arrangements [p. 513] forwarded by Mr. W. T. Dunn informs us, there will be no lecture on this occasion, technically the proceedings should stand prominent in the annals of the Institution. The President (Mr. Thomas Glover) may be relied upon to set a high standard in this respect in his address; and this will give the keynote for the discussions. The members will welcome in the authors of the papers to be submitted at least three new contributors to the proceedings of British gas organizations—Mr. Arthur M. Forshaw, M.Sc., Mr. E. W. Smith, M.Sc., and Dr. Rudolf Lessing. But if Dr. Lessing will, under the circumstances, forgive the remark, there is an especial interest about the two former contributors to the proceedings, inasmuch as they give representation to the link that has been forged between the Institution and the Leeds University, through the special purposes fund; and their communications will report progress in the branches of research upon which they have been engaged.

It will be remembered that Mr. Forshaw was the first to have the honour bestowed upon him of holding the Institution Fellowship in Gaseous Fuel at the Leeds University; the honour being awarded by the Senate of the University, on the recommendation of the Board of Science and Technology. In the annual report of the Council of the Institution presented at the meeting last year, it was stated that Mr. Forshaw had taken up a very promising line of work on the relative "mantle" efficiency of carbonic oxide and hydrogen; and his exploration of the subject, it was expected, would elucidate many obscure problems relative to incandescent lighting. The title of Mr. Forshaw's paper, which the members will anticipate with a large amount of interest, will be "The Efficiency of a Gas in Relation to "Incandescent Lighting." The communication by Mr. Smith will really consist of the report of the Gas Heating Research Committee, with an explanatory note. Mr. Smith is the Chemist to the Committee; and it will be gratifying, and a credit to him personally, if he is able to show a substantial advance in the work, which in some measure has, since its start, been hampered by circumstances beyond control. In their last annual report, the Council were only in a position to give an account of the preliminary work—largely consisting of the arrangements for experimental research—that had been carried out by their Chemist, Dr. Drugman. But towards the end of last year, Dr. Drugman unfortunately had to resign; and Mr. Smith was appointed to succeed him in prosecuting the work of the Committee. He has brought a large experience in pyrometry and gas analysis to this new field of work, together with energy and enthusiasm; and so, though he has only so comparatively recently taken charge of the investigation, we feel confident there will not be disappointment in looking to the report for both interest and instruction on a subject which is of much importance to the gas industry at the present time.

There are the indications in the programme of a considerable part of the proceedings being devoted to matters affecting carbonizing and other retort-house operations. With some assurance, it may be expected that the President will have something to say on the question of his experimental experience with 3 feet deep horizontal retorts at Norwich. An active supporter in the provision of technical fare is Mr. J. Ferguson Bell; and he will be forward with a paper on "Carbonizing." Last year, the meeting was largely occupied with the question of vertical retorts; this year the subject has no representation—in, at any rate, the titles before us. But Dr. Lessing will give the results of his studies of "Carbonization in Chamber Settings." Dr. Lessing has contributed to our pages on the subject; and those members who desire to prime themselves before the meeting as to the Munich and Hamburg carbonizing chambers will find interest in the "JOURNAL" for July 14 last (p. 94), Sept. 15 (pp. 703, 704), and several other issues. Close on the question of carbonization is that of the removal of the spent charges from the retort-house; and Mr. Robert Watson will state, as he sees them, "The Advantages and Disadvantages of a Hot-"Coke Conveyor." Out of financial questions, much controversy can arise; and good discussions should be provoked by Mr. Herbert Lees' "Study of Working Costs," and Mr. Arthur Valon's communication on "The Relative Capital "Accounts of Gas Undertakings owned by Companies and "by Local Authorities." This is an old topic in gas polemics, but one on which there has been little general public discussion. And in an organization in which the members are—excepting those who, like the author on this occasion, are free from official service—either company or local authority men, any debate on it must largely follow partisan lines. The technical programme strikes us as being one from which a vast amount of interest will be extracted; but there is not a single paper that touches the commercial side of the industry. Naturally, however, within the time available for the meetings, it is impossible to look upon more than a fraction of the multitudinous aspects of such a far-reaching industry, and one that is ever expanding in its great service to man.

Gas Engineers on the Calorific Power Test.

THE newest of our District Associations has been the first to discuss—not broadly, but within limits and with caution—the primary proposal for a statutory calorific power test. The discussion of the subject is to be commended; but it will be a difficult matter for some time to come (there is prudence in the course) to get gas engineers in charge of gas undertakings to commit themselves to any definite declaration that this or that number of B.Th.U.'s is correct as a standard for a gas of any given illuminating power denomination. A public pronouncement by individuals now may be brought up against them at some inconvenient season. But the opening that the President of the Welsh Institution (Mr. Thomas Acland) gave to the subject at last Wednesday's meeting, and the contributions to the short debate—if we may mention names without exposing ourselves to invidiousness—of Alderman Canning, Mr. H. D. Madden, and Mr. J. H. Canning show that around the question points can be assembled that can be debated with advantage. The subject is by no means limited to one essential, and that the fair standard calorific figure for gases of given candle power. On this point, the idea must not be allowed to get a too determinate hold that there is a necessarily approximate correspondence between calorific power and illuminating power, because, in the changing carbonization practice, the variation of gas constitution may be such as to knock on the head all such preconceived notions. Herr Körting has disclosed to us in his published tests that some of the gas produced in his vertical retorts on the Dessau system, though poverty-stricken in the matter of illuminating power, has a calorific value that would answer all the requirements of the Gaslight and Coke Company's agreement of 125 calories as the standard, with 112½ calories as the penalty point under the prescribed conditions of testing, and more particularly of the test agreed between the local authorities and the Tottenham Company, with a standard of 450 B.Th.U. For example, what is to be said about the relationship of 10·80 candle power and 545 B.Th.U. net? We should like to make this quite clear, that the standard the Gaslight and Coke Company have

accepted may be regarded as purely tentative. The Governor (Mr. Corbet Woodall) and the officers of the Company do not like the 125 calories for 14-candle gas any more than other gas engineers; and, without the 10 per cent. margin and an average of three days' testing, they would not have agreed to it for a 14-candle standard gas. It may be that, by or before the end of three years, the London County Council will see that the standard and conditions as they exist at present are cumbersome, and that some such figure as 112½ calories, without the (for all the purpose the addition will serve) useless 12½ calories beyond, will be sufficient. The very attitude and insistence of the Company show conclusively their feeling in the matter. Of this point, gas engineers should not lose sight in considering the general question.

There is no doubt about it that the common test now applied to gas is really an anomaly and an absurdity. The principle that the test should have relation with the major purpose of use is an excellent one. The illuminating power test was quite appropriate when applied; but it has receded by leaps and bounds from its old claim to propriety since the incandescent burner, cooking-stoves, gas-fires, and gas-engines became so generally used. The gas that is economically the best for cooking and power is the best for incandescing the mantle and the fuel of the gas-fire. The fundamental idea of a test is the safeguarding of the public; and, if a test in the case of gas is necessary at all, then Parliament will be serving the public better than they are doing at the present time by abrogating completely the illuminating power test, and generally prescribing one—providing it be a fair one—for calorific power only. The test applied should be expressive of the uses to which is put the major, and not the minor, quantity of gas consumed in the country. The President and the speakers at the meeting were unanimous on this score; and their finding is that of practically the whole of the technical men of the industry. Parliament, however, has not yet been asked to completely annihilate the illuminating power test; and they will not—it is no use harbouring any idea that they may do so—remove that protection, however faulty it is, for the public, until the gas industry is agreed upon a test in substitution. And the only substitute will be, having regard to the applications of gas, the calorific power test. But this must not be put forward until there is absolute certainty as to the position, and until the whole of the conditions of use of the calorimeter for penal testing are thoroughly appreciated and defined, and made a statutory requirement. There must be no hole-in-the-corner or slipshod testing in connection with calorific power, any more than in the case of illuminating power. The conditions must all be reproducible. In regard to the prospect of a change, it must not be forgotten that Parliament has not been unmindful of the altered uses of gas, and of the perpetually shrinking importance and claim to necessity of an illuminating power standard, as is seen in their willingness, session after session, to lower (on request) the standard of requirement in this respect. As to dual penalty testing, the Gaslight and Coke Company were strongly disinclined to put themselves under the double obligation; but they had to regard it in their negotiations with the London authorities as a diplomatic concession. Only under very special circumstances, and for very special reasons, would the Governor and technical staff of the Company advocate the companioning of the two tests. It is undesirable and unnecessary; and it must be a *sine quâ non* of any move in the—near or distant—future to make the calorific power test universally obligatory, that the illuminating power test shall go.

If Parliament would allow the gas industry to do without a penal test altogether, so much the better pleased would the gas industry be. There would be the utmost willingness on its part to commit its fortunes to the test only of popular approval, precisely the same as Parliament—though unfairly while gas is subjected to qualitative control—allows the electrical industry to do, in competing for lighting, power, and heating. While speaking of tests and of competitors, there is one small point that may be corrected in connection with Alderman Canning's remarks at the meeting. He seemed to infer that there were no prescribed penalty tests in respect of distributed power gas. That is a mistake. In all the Power-Gas Companies' Bills that have been passed by Parliament, provisions have been inserted prescribing forfeitures for absence of distinctive smell, excess of carbon monoxide, and shortage of specified thermal value. But who are the supervisory authorities?

Low Slot Price v. Fittings Supply.

THE paper that Mr. Edward A. Harman, of Huddersfield, read at the meeting of the Manchester Institution on Saturday does not pretend to be a literary effort; but it is a piece of composition that contains a point in every one of its short paragraphs and tables, and some of the points are striking. Gas supply by slot meter is now ubiquitous, and is so fostered by every gas undertaking of standing, that the making of any show at supporting its claims at this time of day would be treated to the same good-natured derision that advocacy of the importance of also encouraging the use of ordinary meters would now receive. Indeed, the slot meter in these times only lends itself as a subject for discussion in the two aspects of its constitution, and the methods accompanying its application to the service of the industry. And much that is useful can be collected by the recounting of experiences under different conditions of use—conditions that affect the class of consumer by such means, and the degree of service that the gas suppliers render to the consumers in respect of the installation of (to use the one word that comprehends the whole) the "system."

As Mr. Harman in substance points out, the slot-meter system has done as much as anything in the evolution of the current business ideals of the gas-supply industry; and a sounder policy than of yore has fortunately displaced the supine and autocratic demeanour of the past. This in itself is an excellent thing; for had the gas industry pursued the old courses, these would have conducted the gas industry straight on to a persistent decline. While the slot-meter has generally and generously broadened policy in the relationships between gas supplier and consumer, it has not carried the Huddersfield Corporation Gas Department farther than the supply of a cooker with the meter. These are fixed free of charge; but no additional internal fittings are furnished. Before there is condemnation of this limited provision, there are certain figures in the paper to be taken into account which bear upon the situation. Consider that (calculating-in the discount) 40 cubic feet of gas are now supplied to the consumer for 1d., such a quantity would not be possible were the fittings included—as a matter of fact, the slot-meter consumer in Huddersfield is getting his gas at about the same price as the ordinary lighting consumer, 2s. 1d. as compared with 2s. Consider that the slot consumers exceed by about 3000 the number of the ordinary ones—that is to say, they represent 15,624 out of a total of 28,549. Consider, again, that through these slot meters the aggregate consumption is now only about 20 million cubic feet short of the quantity of gas sold to the ordinary lighting consumers; and further remark, from the data submitted by Mr. Harman, the continuous growth in the slot consumption *per capita*. This growth would not have been obtained had it not been for the low price at which the slot consumers are supplied, and for the fact that the large proportion of the slot consumers—12,424 out of the 15,624—use cooking-stoves. What, however, is good for Huddersfield might not be good for other towns. Not to include fittings other than a cooking-stove would in many places prove fatal to the system. But the facts at Huddersfield are as seen.

There may be some question as to the point that the slot consumer obtains his gas at a price so close (2s. 1d.) to that (2s.) of the lighting consumer. One reason for this is that the slot consumer prepays, while the ordinary lighting consumer has credit; another point is that differential prices obtain in Huddersfield—the charge being as low as 1s. 6d. for gas used for stoves and power, less a discount of 5 per cent. for prompt payment. The slot consumer has to pay the one figure all round; so that the ordinary consumer cannot prefer the charge that the slot consumer, in view of the extra expense incurred on his behalf, receives preferential treatment. Incidental to this point, it is interesting to notice that the quantity of gas sold at the lower price through ordinary meters for cooking and power exceeds the amount sold for lighting purposes, and, therefore, taking into account the quantity consumed through slot meters for cooking, the Huddersfield Corporation Gas Department has cause to congratulate itself upon an excellent day-load, and the consumers upon the moderate prices at which the commodity is supplied to them. Among other hints worth taking note of in connection with the paper are these: That the popularity of the slot system is enhanced by the fact that the consumers pay for their gas at the rate of 30 cubic feet for a penny, and get 25 per cent. of the money returned to them by the collector; that this personal interest in the contents of the

money-box causes an unfailing notification of removal; and that the same collector never empties the same money-box twice consecutively. There is no occasion to emphasize these points by comment. Mr. Harman is complimented on his showing under his limited (limited in respect of fittings) system of slot-meter supply, in which low price rather than the initial provision of the means of using the gas, has produced the good results.

Limitations in Competition for Power Business.

It is with satisfaction that we publish to-day an article on "Suction-Gas Competition" by a gas power specialist of such recognized standing as Mr. W. A. Tookey, following up Mr. Henry O'Connor's recent lecture on the subject, and the editorial comments evoked by it. Mr. Tookey is in a position to take an altogether independent survey of the relative positions of town gas and suction gas in the power-gas competition; and his article will be found very suggestive, and therefore worthy of the careful consideration of town-gas men. The cardinal point of the contribution is that gas men should recognize that suction gas has come to stay, and that it and all established rivals—town gas, steam, and oil—have their special fields of usefulness, and that there is a fairly well-defined line of demarcation between their respective spheres. We accept the gentle reproof deducible from the submissions as coming from one who, we are afraid, is not fully cognizant of the aims and aspirations of progressive town-gas men in respect of future carbonizing practice, and the opportunity of paying more attention to the B.Th.U.'s saleable for a given price than to the illuminating power. In the gas industry, we do not desire, in this transition stage of gas-manufacturing practice, to grow accustomed to recognizing limitations of application of the primary product; but we do want to make the most of the part of the power field that is at the time particularly available, and to retain as much as possible of other parts. Mr. Tookey's hints as to the area that is especially suitable for exploitation by town gas are of practical utility.

That it would be the height of folly for town-gas men to work within a bounded area for power purposes, is one of the chief lessons to be drawn from our contributor's article. "There can be," he remarks, "no question that town gas is "the gas *par excellence* for engine work. It is eminently suit-"able in composition, cleanliness, uniformity of quality, con-"venience, and constancy. It requires less capital outlay, "less attention, less water. It gives more power per unit of "cylinder capacity, can be obtained at a moment's notice, "and all stand-by losses are avoided. But, notwithstanding "all these good qualities, suction-gas competition exists. "Suction gas is a suitable fuel, but needs all the above merits "to be qualified. . . . All items of running costs [with it] "are higher, as well as the increase in capital expenditure; "while any great variation in the quality of the solid fuel "burnt ofttimes leads to irregular and unsatisfactory work-"ing." With such a multitude of advantages in favour of town gas in contrast with suction gas, there is reason sufficient for not contracting the view as to the possibilities of town gas. In the superiorities of town gas are seen the inferiorities of suction gas; and among experienced manufacturers (our suction-gas friends must admit) there is steady growth in recognizing these things. The superiorities of town gas, as listed in the article, are weighing heavier and heavier in the balance of the manufacturers' preference; and the inferiorities of suction gas are largely discounting the face-value of its advantage as to gas cost per given horse power. Mr. Tookey supplies some comparative costs on a theoretical basis; but these costs are greatly departed from when the suction-gas plant takes its place, and has to accept its share and chance, in the common routine of a works. There are few works that can afford to keep gas and gas-plant specialists on their staffs.

"There is," remarks Mr. Tookey, "absolutely no reason "why any suction-producer plant should not give every satis-"faction; and the fact that a number have been abandoned "shows incompetence of the erector, rather than defects of "the apparatus." Deficiencies of suction gas compared with town gas cannot all be ascribed as faults of the erector; and those deficiencies we know have had, in certain instances, an effective persuasive influence in causing manufacturers to evict from their premises something that they found introduced a serious obstruction to the regularity of their operations. It may, of course, be possible to erect an apparatus that is free from all structural defects; but yet the conditions of working, and the shortcomings of the product itself, may be disastrous to regularity of operation. This has been a by no means limited experience in practical working; and the disadvantages have gone to emphasize the advantages of using town gas, where the former have not so sickened the manufacturers that, reviling gas both gross and refined, they have gone direct over to electricity. Incompetence of the plant erectors, we repeat, is not the only cause of abandonment. In the cases of many abandoned plants (we might with a fair amount of confidence assume it has been so in all), the users have not gone to the length of discarding them without consulting the makers, and without attempts being made by the latter to realize satisfaction. Success from the manufacturers' point of view has still been wanting. At the same time, we do not refuse to recognize that suction-gas plants do, under other conditions, answer the purposes of manufacturers, but then not a few are happier for having town gas as a stand-by. All points considered, there is no necessity within sight for confining operations for power business on behalf of town gas, where reasonable terms are offered. To do so at the present time would be a deplorable mistake.

Continued Blocking of the Gaslight and Coke Bill.

The ways of parliamentary procedure, and the modes of expression, are sometimes deceiving. When the Bill of the Gaslight and Coke Company was before the House on the 13th inst., Mr. W. Thorne stated that "he did not intend to move his resolution," to the effect that the Bill be read the third time that day six months; and, as our own report and the minutes of the House showed, the Bill was thereupon formally considered, and ordered to be read the third time. In view of this, we may be excused for having arrived at the conclusion that the blocking of the measure by Mr. Thorne was at an end. When, however, the Bill came up on the order for third reading last week, Mr. Thorne again objected. Thereupon the third reading was deferred to Thursday, June 3.

South Wales Deadlock.

During the past week, matters reached another stage in the South Wales coalfield, with reference to the dispute over the Miners' Eight-Hours Act—and it is a stage that must be regretted by those who have the real welfare of either the miners or the coalowners at heart. At the same time, the deadlock which has been reached is not likely to have caused any great amount of surprise to those who have been carefully watching the trend of events in that important part of the country. We stated last week that a demand made by the owners for a 7½ per cent. reduction in wages had been referred to the Independent Chairman of the Conciliation Board; while the owners had agreed to refer to a Joint Sub-Committee the question of the working arrangements under the Eight-Hours Act. This Sub-Committee duly met and prepared their report, which was submitted at a meeting of the Conciliation Board last Friday. The effect of the report was that they had failed to agree upon the matters in regard to which they were appointed to endeavour to come to a settlement. It seems that the owners were willing to concede a good deal; but at last a point was reached beyond which they would not go. For instance, they waived their demand for a reduction in day-men's wages, and apparently also withdrew their contention that the existing wages agreement must necessarily terminate at the end of June. The point, however, on which they declined to budge had reference to their contention that under the new Act the men are liable to be called upon, and must be called upon, to work sixty hours per annum in addition to the eight hours per day. This the men would not accede to; their argument being that they were prohibited by the Miners' Federation of Great Britain from agreeing to any extension of hours without first putting the matter before them. An amicable outcome of the Sub-Committee's deliberations having therefore not been arrived at, the owners promptly reverted to their original standpoint, and determined that they will on June 1 serve notices to the effect that all existing contracts of service are terminable, by the Act, at the end of the month named. This action Mr. Brace, M.P., describes as "holding a pistol to the heads of the men;" but in some other quarters it is looked upon as a formality which, in view of the Counsel's opinion they had received, the owners

would in any event have felt compelled to carry out. Those leaders of the men who have ever counselled or threatened a strike will have a pretty clear idea of what "holding a pistol to the head" of anyone really means. The exact position of affairs appears to be that, though the owners firmly believe the new Act will automatically put an end to the existing wages agreement (which otherwise would not expire until next March), they are nevertheless prepared to allow the agreement to run its normal course provided certain concessions are granted them. These concessions have not so far been conceded; and, unless they are, the existing agreement will not be allowed to run its "normal course," but will terminate on July 1, when the new Act comes into operation. The position of affairs still contains a large element of speculation; but we feel almost inclined to agree with the particular leader of the men who says he "cannot remember a time when the outlook was so threatening." It is to be hoped, however, that he is anyway wrong in his prophecy that "this fight will not be confined to South Wales, but will be a fight throughout the whole of the British coalfield." Every effort must be made to limit the area involved. Subsequent to the events above alluded to, the Independent Chairman pronounced in favour of the reduction in wages of 7½ per cent.

The London and Southern Junior Session.

With the annual general meeting which was held last Friday, the London and Southern District Junior Gas Association have completed a session upon the success of which the officers, contributors, and members are all to be congratulated—the officers on the excellent programme prepared, the contributors on their active support in the shape of papers, addresses, and personally conducted visits, and the members on their active support at the meetings, without which the best of programmes must be of no avail. We learn from the remarks made on Friday by the President (Mr. W. J. Liberty) that the Association, which has been in existence seven years, has a membership-roll of 123, drawn from no less than 21 gas undertakings. This widespread representation shows that there is a general interest in the Association—whose area is naturally a very large one. Of course, the London Association, like the other similar organizations, from time to time experience losses through members taking up more responsible positions; but upon such losses as these the Junior Associations are to be congratulated, for they show that the members are made of the "right stuff." The business transacted last session included an opening address by Mr. H. E. Jones on "Labour," a lecture by Dr. Samuel Rideal on "The Hygiene of Gas Lighting," and some half-dozen papers on subjects of close concern to the members; while, in addition, there were a number of visits to gas-works and other places of interest. The address of Mr. Jones, already referred to, was, it may be mentioned, only one of his attentions to the juniors during the past year; for it will be remembered that, on the occasion of the joint meeting of the Junior Associations at the Franco-British Exhibition last August, he also delivered an address which was greatly enjoyed by those who were privileged to listen to it. The joint meeting was altogether a successful function, and formed a worthy sequel to the similar enjoyable gathering which took place in Manchester in 1907 at the time the Gas Exhibition there was open. It will be seen that Mr. Liberty has been chosen to act as President of the London and Southern Junior Association for another year; and if the next session under his leadership should prove as successful as has been the one which has just terminated, the members will have no reason to regret their choice.

Mr. H. D. Lumb, of the Mirfield Gas-Works, has been appointed Assistant Manager to the Yeovil Corporation Gas Department.

Mr. John H. Chew, of the engineering staff at the Blackpool Gas-Works, has been elected a Fellow of the Chemical Society.

Mr. John R. H. Jacobs, the Assistant Secretary and Accountant to the Reading Gas Company, has been appointed Secretary to the Southampton Gaslight and Coke Company. There were over 60 applications for the post.

We regret to learn from Mr. A. G. Cloake that he has recently sustained a loss by the death of his Director, M. Remi Jacquemart. Deceased was for many years Director-General of the "Société Anonyme Métallurgique d'Aubrives et Villerupt," and was much respected and loved by all employed under him. He frequently visited England, and was known to many British Engineers. Members of the Association of Water Engineers will doubtless have a pleasant recollection of the entertainment given to them under his auspices at Aubrives.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 537.)

Business on the Stock Exchange last week was a good deal quieter than it had been the week before. In some of the more speculative lines, there was at times plenty of animation; but the more staid and humdrum departments were taking a rest. There was no stirring incident to quicken-up movements. The week opened in cheertul mood, and some small advances in price were effected; but business was on too limited a scale to have much influence. The best gilt-edged were firm, and the Foreign Market was steady; but the Railway Market was not strong. Tuesday was also a quiet day, but some investment buying lent support. The Railway, Foreign, and South African Markets were in favour. Wednesday underwent somewhat of a revulsion, and the tendency was downwards; Consols and the like being lower. Business on Thursday was, if anything, quieter still. The tendency was, however, more favourable, and Consols had a fractional recovery. The pendulum started swinging the other way on Friday. Most lines dropped for lack of support, and Government issues were depressed by the imminence of another Colonial Loan. Consols receded $\frac{5}{16}$. Saturday was steadier, and a few lines picked up a little. In the Money Market, the tendency was for rates to harden; and discount terms began to stiffen slowly and steadily. Business in the Gas Market was well up to the mark in point of volume, and several issues which are not often dealt in changed hands. In addition to this, there was another sale at the Mart, where several Suburban and Provincial issues found ready buyers. In Gaslight and Coke, the ordinary was fairly active, and was strong enough to gain half-a-point; transactions ranging from 103¼ to 104. In the secured issues, the maximum was done at 88¼ and 88¾, the preference at from 105½ to 106½, and the debenture at from 85½ to 85¾. South Metropolitan was fairly active at the figures of the previous week—123-124¼. The debenture was done at 85½. In Commercials, the 4 per cent. realized 108½ and 109¾, the 3½ per cent. 103½ and 104, and the debenture 83. In the Suburban and Provincial group, Alliance and Dublin old made 17⅞, ditto new $12\frac{9}{16}$, Brentford debenture 103, British 42⅞ and 43⅛, Bromley "B" 89, Ilford debenture 104, West Ham from 120½ to 121⅞ (a rise of 2), and ditto debenture 107½. In the Continental companies, Imperial was a point weaker at from 181½ to 183½, and the debenture was done at 95½ and 96½. Union advanced ½, with business at 100 and 101; and both European issues advanced ¼ without business done. Among the undertakings of the remoter world, Bombay fully-paid changed hands at 6, Buenos Ayres at from 13¼ to $13\frac{9}{16}$, Cape Town at 4⅜, Melbourne 5 per cent. at 101½, Monte Video at 12⅝, Primitiva at from $6\frac{33}{32}$ to 6⅞, ditto preference at from 5¼ to 5⅜, and River Plate at from 14⅝ to 14⅞.

ELECTRICITY SUPPLY MEMORANDA.

Electricity in Parliament—Trading in Electric Wiring and Fittings—The Control of Parliament—Municipal Trading Losing Favour—The Interfering County Council—Wanted, a Suitable Linking-Up Scheme—Electricity, plus Rent and Maintenance.

There are a few matters referring to electrical legislation that have recently appeared on the parliamentary ground at Westminster which are of general interest, and therefore may be noticed here. The Electric Lighting Acts (Amendment) Bill is making better progress this session than it has heretofore done. In its progress, it is being touched up here and there to give satisfaction to parties; but every change produces dissatisfaction in other quarters. It is a trite saying that it is impossible to please everybody; and Parliament is perfectly cognizant of the well-established fact. The last move in the House of Lords in connection with the Bill has put municipal suppliers of electricity under an injunction which they would have preferred being without, but which the Electrical Contractors' Association have fought for continuously. The Bill originally proposed that, if municipal electricity departments engaged in the providing, letting for hire, fixing, &c., of electrical fittings or apparatus, the business should be conducted financially so that it would not impose any burden either on the undertaking or the ratepayers. At the instance of Lord Avebury, however, the business is now only to be done through a contractor; but, if there are no contractors in an area of supply, nothing is to prevent municipal electricity departments carrying out the work themselves. On principle, being unfavourable to municipal trading, we ought to endorse the action of the House of Lords in insisting that the work should be done through the local trade. But, so far as gas is concerned, there are so many reasons why it is preferable that fittings work should be carried out in all branches direct by the suppliers of gas, that we could not, if the restriction were applied to gas, give it any warm approval. The gas or electricity department knows best what is required by the consumer; and it is to the interest of the consumers and the suppliers of gas to get the work done at the cheapest possible rate without the intervention of too many profit-makers. If the municipal department supply and fix the fittings, there is a responsibility upon them; and as the Earl of Onslow says, it is very convenient to be able to hire fittings

direct from gas and electricity suppliers. On the other hand, Lord Faber thinks it is undesirable to give local authorities the power in any shape or form, because they are under statutory obligation to inspect wiring and fittings, and it would be unwise to allow them inspecting authority over their own work. However, gas authorities have no great care whether the fitting work in connection with municipal electricity supplies is done through the department or a contractor, so long as there is compulsion to put the business on a paying footing, so long as there is someone to see that this is done, and so long as gas undertakings are not called upon to pay through the rates any of the losses occasioned by the trading, and have not to face rate-aided competition.

There is no doubt Parliament has had an awakening lately as to its responsibility in the matter of municipal trading. This is seen in what has been done in the placing of greater control over the gas revenues of the Salford and Oldham Gas Departments, so that there is a limitation attached to the amount of profits carried over to the rates, and so that the consumers are not affected by gas being taken free from the undertaking for public purposes. It would be a good thing if this was carried further in the case of municipal electricity supply, by making it compulsory, after some definite incubation stage, for electricity charges to be so ordered that there was no loss on a concern. There is observed in the remarks of Lord Hamilton of Dalzell, in moving the third reading of the Electric Lighting Acts (Amendment) Bill, a further indication of the tendency of Parliament to place greater control over municipal electricity suppliers. Sub-section 1 of clause 5 of the Bill provides for the supply of electricity to railways, tramways, and canals partly outside the area of supply. His Lordship made this remark: "The Board of Trade will carefully consider the circumstances before giving their consent, and, in particular, will endeavour to prevent extravagant speculation on the part of local authorities which might injuriously affect the interests of the ratepayers and consumers of electricity within the area." We hope the Board of Trade will act wisely and well in this matter.

One more instance showing that, at any rate in the House of Lords, municipal trading is losing favour, arises in connection with the North Metropolitan Electric Supply Bill. The Company may supply energy for haulage and for lighting railway carriages, but they cannot supply current for illuminating railway stations situated in the areas of other authorized distributors. Twice before they have tried to get the disability removed, but have failed. On the third time of asking, however, the House of Lords have conceded the power, though the West Ham Corporation raised strong but ineffectual objection to the competition. The North Metropolitan Electric Supply Company were supported by Mr. J. F. Gooday, the General Manager of the Great Eastern Railway Company; this gentleman making it clear that he is anything but in favour of municipal trading.

Some of the local authorities of the Metropolis are crying out against the London County Council for meddling with Electric Supply and other Private Bills in Parliament. It has been one of the County Council's "funny little ways" in connection with Gas Bills over a long course of years; and the gas suppliers and consumers of the Metropolis have had to grin and bear the consequences. The inception of the electrical protest rests with the Westminster City Council; and they are backed by the Borough Councils of Battersea, Camberwell, Chelsea, Fulham, Kensington, Shoreditch, Southwark, Wandsworth, and Woolwich. All these authorities call the action of the County Council "an encroachment on the jurisdiction of the Metropolitan Borough Councils in electric supply and other Bills." The County Council are not penitent. On the contrary, they have announced that there is no intention on their part to discontinue the policy of which complaint is made. If the County Council supervision is good for the gas companies, it is surely good for the electricity authorities. There is a right to expect equality of treatment and attention from the Council. Whatever may be our individual views on special matters taken up by the Council, and affecting the interests in which one may be directly concerned, it is certain that it was a good thing for the ratepayers of London that the present County Council quashed the electricity supply scheme of their predecessors.

The value of the linking-up powers that a bountiful Legislature has conferred upon the electricity suppliers of the Metropolis has not yet been fully decided. The authorities have got the powers; but they do not know how to put them to the best use. There have been meetings at which resolutions have been passed and arrangements made for the consideration of schemes for unifying and standardizing the electric supply of London. It will be a queer thing if, after the linking-up project of last year having been successfully utilized as the highway to the destruction of the last of the London power schemes, no practical means can be evolved by which the new powers can be utilized. Those chiefly concerned are not at all certain on the subject. A resolution passed at a conference of the borough council and company electricity suppliers implies the existence of a doubt. The resolution was—"That, in the opinion of this Conference, it is advisable, *providing a suitable scheme can be formulated*, that the powers conferred under the London Electric Supply Act, 1908, should be carried out by the local authorities and companies jointly." It is a pity perhaps that Parliament did not, before conferring the powers, inquire whether the promoters had a suitable scheme up their sleeves for giving effect to the authorization. However, a consultative committee has been appointed to penetrate the matter deeper and see what can be done. Going a little further afield. Reference has been made once or twice in the "Memoranda" to the project for intercommunication between the systems of the South Metropolitan Electric Supply Company and the Beckenham District Council, as a provision against breakdown. There was some doubt, however, whether the existing powers of the two authorities would allow them to give effect to the idea. The Board of Trade were taken into their confidence; and the Board have informed the parties that, while the Company are authorized to supply Beckenham, the Council cannot, under the existing law, reciprocate. But if the Bill in Parliament this session passes, all obstacles will be removed.

Electricity suppliers are ever devising some new schemes for the purpose of getting together a larger *clientèle*. The Woolwich Borough Council have just come out with a project. It is described as "a sound assisted wiring scheme, which makes it possible for the Council to offer a cheap and efficient supply." It is also said that "many promises of support" have been received. The Hastings Corporation have had many promises of support in connection with their business extension schemes; but alas! promises are often broken. The Woolwich scheme, however, is interesting enough for notice. The Council propose to put in complete installations of not less than six points of lighting, in approved revenue-earning positions, in houses exceeding £32 rental per annum without initial cost. The Council are to take a rent of 7d. per lamp installed per quarter for installations in Woolwich and Plumstead, and in Eltham 3s. 6d. additional for the necessary transformer—these rents to be perpetual, unless the installation is purchased. This means that, in addition to the account for current and the cost of lamps, the user of the six lamps in Woolwich and Plumstead is to pay 14s. a year rent, and in Eltham £1 8s. After the expiration of the twelve months' guarantee, the consumer is also to maintain the installation in full working order, or the Council will do this work for him at an additional charge of 9d. to 1s. per lamp per quarter—that is to say, maintenance charges, if we construe the conditions correctly, for these little six-lamp installations will amount to from 18s. to 24s. per annum, and electricity and rent on top of this. If this is how "electricity" comes out "cheaper than gas," well gas suppliers need not be startled, however shrill the dishonest cry.

SOCIETY OF BRITISH GAS INDUSTRIES.

Livesey Memorial Fund.

Amount subscribed through the Society of British Gas Industries by the following members and others . . . £433 11 0

Anti-Vibration Incandescent Lighting Co., Ltd., Otley.
J. & J. Braddock, Oldham.
Clapham Bros., Ltd., Keighley.
S. Clark and Co., London.
Cannon Iron Foundries, Ltd., Deepfields, near Bilston.
Carron Company, Carron.
Clayton Son and Co., Ltd., Leeds.
Dugald Clerk, London.
Edward Deane and Beal, Ltd., London.
Davis Gas-Stove Company, Ltd., London.
Robert Dempster and Sons, Ltd., Elland.
Drakes Limited, Halifax.
Fletcher, Russell, and Co., Ltd., Warrington.
Charles E. Fry, Leamington.
First Dutch Bog Ore Co., Ltd., Leamington.
George Glover and Co., Ltd., London.
J. William Glover, London.
Thomas Glover and Co., Ltd., London.
Gibbons Bros., Ltd., Dudley.
B. Gibbons, Jun., Ltd., Dudley.
Gas Meter Co., Ltd., London.
Harris & Pearson, Stourbridge.
Ingram and Kemp, Ltd., Birmingham.
Imperial Stove Co., Ltd., Leamington.
W. J. Jenkins and Co., Ltd., Retford.
Leeds Fire-Clay Co., Ltd., Wortley, Leeds.
R. Laidlaw and Son (Edinburgh), Ltd., Edinburgh
Metropolitan Gas-Meters, Ltd., Nottingham.
Marsh and Thorp, Manchester.
R. & A. Main, Ltd., London.
James Milne and Son, Ltd., Leeds.
Mobberley and Perry, Ltd., Stourbridge.
National Gas-Engine Co., Ltd., Ashton-under-Lyne.
G. Orme and Co., Oldham.
E. J. & J. Pearson, Stourbridge.
Richmond Gas Stove and Meter Co., Ltd., Warrington.
Sturtevant Engineering Co., Ltd., London.
F. C. Sugden and Co., Leeds.
William Sugg and Co., Ltd., London.
Sawer and Purves, Manchester.
Tilley Bros., London.
Townson and Mercer, London.
Joseph Taylor and Co., Bolton.
Tangyes Ltd., Birmingham.
Thos. Vale and Sons, Ltd., Stourport.
J. E. Williams and Co., Manchester.
Wilson and Mathiesons, Ltd., Leeds.
West's Gas Improvement Co., Manchester.
George Winstanley, King's Norton.
George Waller and Son, Stroud.
C. & W. Walker, Ltd., Donnington, Nr. Newport.
Williamson, Cliff, Ltd., Little Bytham, Grantham.

Amount as above	£433 11 0
Amount subscribed direct to the Institution of Gas Engineers by members of the Society of British Gas Industries, and already acknowledged	137 1 0
Total	£570 12 0

Mr. H. J. Ibbotson, who has been representing several manufacturing gas engineers in Japan and the Far East, has returned to England on business; and he expects to remain in this country for three months.

PRESENTATION TO MR. CHARLES CARPENTER.

THERE was a large gathering of the employees of the South Metropolitan Gas Company at the Livesey Institute on Monday last week, on the occasion of the presentation to Mr. Charles Carpenter of an illuminated address of congratulation on his elevation to the position of Chairman of the Company. The following account of the proceedings is taken from an advance proof of the report which will appear in the forthcoming number of the "Co-Partnership Journal," and for which we are indebted to Mr. Walter T. Layton, the Editor of that publication.

Mr. J. F. BRAIDWOOD, the Engineer of the Greenwich station of the Company, presided. In opening the proceedings, he said the idea of the address was suggested by the Station Engineers, and had been cordially taken up. He called upon Mr. C. Franks (the Hon. Secretary of the Committee) to read the address, which was as follows:—

To CHARLES CARPENTER, *Esq., Chairman, South Metropolitan Gas Company.*

Your retirement from the position of Chief Engineer, your election as a Director by the shareholders, and your acceptance of the chairmanship, at the invitation of your colleagues on the Board, are events of such supreme importance in the history of the Company, that we feel the occasion should not be allowed to pass without placing on record an expression of the feelings of pride, respect, and esteem with which we regard you.

Thirty-five years ago you entered the service of the Company at the Greenwich works, and have risen by force of character and intellect to the highest position therein attainable; making a reputation as an engineer, organizer, and administrator second to none in the industry.

We congratulate ourselves that throughout your brilliant career you have devoted yourself to the interests of this Company, and that one so intimately acquainted with its history and policy, and so fully qualified by conspicuous ability, knowledge, and experience, has been chosen to succeed the late distinguished Chairman, our revered friend and benefactor.

The fact that you, as successor to the great founder of co-partnership in the gas industry, have been familiar with the system from its inception, have identified yourself with it, have experienced its advantages, and witnessed its beneficent influence upon the relations of employer and employed, and the condition and prospects of wage-earners, is a matter of profound satisfaction to us.

It is our earnest hope that you may for many years enjoy health and strength to discharge the great responsibilities of your high position; and we look forward with complete confidence to the future of the Company under your guidance.

In conclusion, we assure you of our loyalty to yourself and the Board, and that no effort shall be wanting on our part to maintain the prosperity of the Company which it is our privilege to serve as co-partners.

May 17, 1909.

Mr. J. TYSOE said it was impossible to add anything to the words of the address; but he wished, as a former colleague, to say he agreed with all that was said therein. Mr. Carpenter had attained his position by sheer hard work without any element of luck. Many who were present could speak of acts of kindness and consideration by their present Chairman which led them to believe that he would hold a place in the hearts of all of them—not as Chairman of the Company, but as Charles Carpenter.

Mr. BEARD, speaking as a workman, desired to add his testimony to what had been said. Twenty years ago he would not have dared to speak from that platform, but to-day they could speak to their Chairman as friend to friend. Mr. Carpenter had gained their esteem by his strict sense of justice; and he was worthy in every respect of the part he had to play.

Mr. MEWS (a Director) said the Board felt that Mr. Carpenter had earned his position by his assiduity and capacity. In him, they had a man after their own hearts. Both Directors and men knew that Mr. Carpenter was the right man in the right place.

Mr. Braidwood then formally presented to Mr. Carpenter the beautiful volume, containing the address and 5504 signatures, which was bound in white morocco with silver-gilt mountings.

Mr. CARPENTER, who was received with very hearty and prolonged cheers, said that was the most momentous day of his life. Certainly, any other ordeals which he had had to go through did not compare with it in the emotions to which they gave rise. Eloquence had been defined as the ability to implant one's own sentiments in the breasts of others. He could claim no such gift as that, but, after the manner in which they had been addressed that day, and after the responses thereto, he must feel that he had, at any rate, done something in his long association with the Company to warrant their confidence and esteem. As Mr. Braidwood had truly said, it was thirty-five years ago since, a lad in his 'teens, he had entered the Company's service. After the necessary formalities of paying his footing had been gone through, he must say that everyone with whom he had come into contact spared no pains in answering all that he was continually desiring to know. He inquired about everything he saw, and on every hand there was every desire to help him. There were one or two things that struck him very forcibly and very happily as he looked back over those thirty-five years. Men used not to be very particular how they talked between themselves; but he remembered that, when they were addressing one another in their own particular vernacular, if they saw him near they were more moderate than when among themselves. This showed a kindly disposition towards a youngster. In one respect he could not agree with what Mr. Tysoe said. Certainly there was one instance in which he did think the chance or luck referred to by him had come in. This had been when an immediate superior had distinguished himself by making an unfortunate blunder, and, as a result, was called upon to resign his position. When the vacancy happened, he (Mr. Carpenter) was ready for it; and, as it was thought that he could occupy the position satisfactorily, he had it. The moral to draw from this was that one could not do too much in acquiring all the knowledge and information lying at one's hand—closer than one often realized. He would say: Take your cricket when you can, and your football when you must; but lose no opportunity of acquiring the knowledge that is necessary to understand one's business, and that could only be got by patient study. It would take him too long to go through the many names that came into his mind as he looked back over the years he had passed with the Company. To all and every one of them, he owed something—to many of them a great deal. Mr. Braidwood had spoken very eulogistically. It was one thing to address a body of shareholders, who, he might say, to some extent did not know, and it was another thing to speak, as he was doing then, to those who did know. He could only say that he had had no other object, while in the service of the Company, than to do what he believed to be right and fair. If they asked him what his ambitions were, they were to be a reputable engineer. Other duties, such as those which pertained to his present position, came along without his own seeking, but in a manner with which they were all familiar. He had said before that he owed very much to those with whom he had been associated. He thought it might be said they were honouring themselves on that day quite as much as they were honouring him, because the choice of the Directors, if he might say so, had been foreshadowed by their own choice in the matter, and by that he meant their disposition and good feeling towards him. Had it not been what it was, he felt quite sure he would not have been made Chief Engineer, and, in that case, he would certainly not have been chosen as Chairman of the Company. He could only thank them very imperfectly for the beautiful expression of their regard for him. He could not think of any more admirable manner in which they could have done it; and the address, with its valued signatures, would be one of his greatest treasures. He could not hope to take the place of their dear friend, Sir George; but he could promise them that he would always do his best to be sincere and just to them all.

Mr. BUSH (a Director, and formerly the Secretary of the Company) said he was delighted to be there that day to witness the presentation to Mr. Carpenter, because it showed that the officers and employees believed that they had in him an upright, honourable, just gentleman as Chairman. He had been associated with Mr. Carpenter for a great many years; it was no secret that they were very sincere friends. He had watched Mr. Carpenter's career with much pleasure; and he was quite sure that there was no man who could have filled the position occupied by the late Chairman better than Mr. Carpenter.

On the motion of Mr. SIMS, a vote of thanks was accorded to Mr. Braidwood for presiding; and its acknowledgment brought the proceedings to a close.

THE LIVESEY MEMORIAL FUND.

WE have received from Mr. Walter T. Dunn the following list of further contributions to the fund:—

1909.		£	s.	d.
May 17	Previously acknowledged	9164	13	1
,, 19	Arthur Valon, Westminster	3	3	0
,, 20	Southern District Association of Gas Engineers and Managers	42	0	0
,, 22	Robert Beynon, Torquay	10	6	
	Bradford Corporation Gas Committee	52	10	0
	A. Macpherson, Kirkcaldy	1	1	0
	Society of British Gas Industries—see separate list (p. 503) and note at foot of list	433	11	0
	Midland Junior Gas Association—Second List of Subscriptions:—			
	Mr. B. W. Smith . . . 10s. 6d.			
	,, W. J. Fletcher . . . 7 6			
	,, T. Brooke 5 0			
	,, C. Carrington Barber 5 0			
	,, Owen Evans . . . 5 0			
	,, A. G. Phillips . . . 5 0			
	,, W. Batt 2 6			
	,, W. Lycett 2 6			
	,, W. C. Hawtin . . . 2 6			
	Midland Junior Gas Association 14 6			
		3	0	0
	Total	£9830	8	7

THE USE OF TAR ON ROADS.

Some Interesting Statistics.

The Roads Improvement Association have done a very useful work by the issue of a pamphlet, bearing the title of "Dust Problem Statistics," prepared by the Secretary (Mr. Rees Jeffreys) for presentation to the recent Road Conference organized by the County Councils Association, some of the papers submitted at which were noticed in the "Journal" for the 4th inst. (p. 305). The pamphlet, which comprises nearly 200 pages, is a return of the methods adopted, and the materials used, by the road authorities of Great Britain during the year 1907-8 to render their roads dustless, together with the costs and the results of the processes adopted. In his preface, Mr. Jeffreys explains that, the treating of road surfaces by tar being recognized as the most efficient and effective means of rendering roads dustless without reconstructing them, the Association, when circularizing the authorities for the purposes of the pamphlet, asked those who had carried out this work to give particulars of the methods employed. The replies were summarized, and they were given in a special section of the book. Introductions have been written by Mr. H. E. Stilgoe, M.Inst.C.E., City Engineer and Surveyor of Birmingham, and President of the Association of Water Engineers, and Mr. H. P. Maybury, the County Surveyor for Kent; and Colonel R. E. Crompton, C.B., M.Inst.C.E., the Vice-Chairman of the Association, has contributed a memorandum on "Last Year's Road Improvements."

In the course of his introductory remarks, Mr. Stilgoe says:

> The application of coal-gas tar to the surface of macadamized roads, practised some five years ago in almost an experimental manner, has become an established principle in many parts of the country. No little credit is due to the Roads Improvement Association in inaugurating the dust-laying competitions held two years ago, and thus bringing the matter prominently before the notice of local authorities. The process has gradually advanced, and machinery has been invented by which the tar can be applied hot or cold, under pressure or otherwise, either by horse-drawn or mechanically-propelled vehicles. Apart from the question of dust-laying, and the immense comfort conferred upon the frontagers to, and the users of, the street, thereis great advantage derived in the preservation and lengthened life of the carriageways. While the benefit of the tar lasts, there is found to be less mud, that the surface is practically waterproof, and that the destructive effect of frost is hardly apparent. These advantages are obtainable at a cost of about 1d. per square yard. The duration of the benefit is dependent on the condition of the road when the tar is first applied, the amount of the traffic, and the weather. Generally speaking, the advantages are greatly in excess of the cost of the work; and there can be no doubt that the application of tar to macadamized streets is a great boon to all concerned.

Mr. Maybury, who was formerly Gas Engineer to the Malvern Urban District Council, makes the following observations:

> Tar, in one form or another, must of necessity be the best medium for dust abatement, and will, upon its merits, continue to occupy the premier position. When considered from the point of view of cost per ton only, no other product can approach it. I suppose the average price paid by road authorities to-day for crude tar does not exceed 35s. per ton; and this quantity suffices to treat one-tenth of a mile of road surface, making same practically dustless and waterproof for one year. Gas companies, and local authorities owning gas-works, would be consulting the best interests of their undertakings if they would endeavour to help the road surveyor by increasing the storage capacity at their works; thus conserving the winter's production of tar for use upon the roads in spring and summer, and at the same time securing a better price per gallon than they now obtain from the distiller. The engineers of the larger gas-works could still further improve their balance-sheets by arranging to supply a "freed" tar to a standard specification. Crude tar, unfortunately, contains a large percentage of ammoniacal liquor, together with more or less supho and ferro cyanides. These impurities in the tar, when laid upon the road, render the surface less firm, dense, and durable than when "freed" tar is used. Special treatment with the production from each works is necessary if uniformity in results is to be achieved. The conclusion arrived at by the Paris Conference was that road improvement and dust abatement were to be looked for in the extended use of tar, together with that of the best hard granite, syenite, basalt, &c.

Coming to the section on "The Treatment of Road Surfaces with Tar," information was sought under the following headings: (1) Preparation of the road. (2) Kind of tar used, and price. (3) Number of square yards treated per gallon of tar. (4) Whether sand or any other material was spread over after treatment. (5) Cost of spreading, and particulars as to whether tar was machine sprayed or laid on by hand labour. (6) Life of the treatment. (7) Comments. The following is a brief summary of the replies, some typical ones being given in each case:

(1) To this question 180 replies were received. Of the total, 56 surveyors pointed out the necessity of thoroughly cleansing the road from dust by sweeping it first by machine brooms, and afterwards by hand brooms; 96 specified that the road should be well swept; 25 stated that the road should be in good condition; and 17 sent general replies.

(2) The 180 replies to this question revealed the fact that 134 authorities used crude or ordinary gas tar, that 25 used distilled or refined tar, and that 6 used oil-gas tar. The prices varied from 1d. to 4d. per gallon; the usual price being between 2d. and 2½d. There were 29 authorities who used specially prepared materials, such as "Tarvia," "Tarmite," Clare's patent tar compo, and "Dustabato."

(3) There were 156 replies to this question. In 33 cases, the spread was between 3 and 5 square yards to the gallon; in 99 cases, between 5 and 7 square yards; in 19 cases, between 7 and 9 square yards; and in 5 cases it was more than 9 square yards. When specially prepared tarry materials, oil-gas tar, and ordinary tar mixed with oil were used, the average spread to a gallon of tar was greater than with crude or distilled tar.

(4) To this question 166 replies were received; and of this number 77 of those who responded used sand, 37 used small (¼-inch) granite chippings and granite dust, 10 used large (over ¼-inch) granite chippings, 14 used limestone chippings or dust, 8 used slag chips or slag dust, 19 used road grit material removed from the road before treatment, and 15 used various local materials, such as shingle, pea gravel, cinder dust, &c. In five cases the surveyors did not place any material on the road after tarring it. Several expressed the opinion that granite chippings are superior to other materials for spreading over newly tar-treated roads. In many cases the superfluous material was swept off after a period when the tar was dry.

(5) There were 160 replies on the subject of the cost of spreading the material. In 49 cases it was applied by machine, in 84 by hand, and in the other cases no information was given. The average cost of treating the road surface with tar, including all expenses of preliminary sweeping, tar, sand, or other material spread after treatment, and labour, varied between 0·7d. and 3d. per square yard. The usual cost, however, was 1d. to 1½d. when a machine was used, and 1½d. to 1½d. with hand labour. The variations in cost were due principally to the greater or smaller area dealt with per gallon of tar, and to the cost of the material spread after treatment. Further, when two coats were given, the cost for the second coat worked out much lower. The cost of spreading only was given in a few cases, and it varied between 0·1d. and 0·4d. per square yard; being nearer the former figure when the material was applied by machine, and nearer the latter when applied by hand.

(6) With regard to the life of the treatment, 133 replies to the question were received. In 61 cases it lasted a season, or from six to nine months; in 54 cases, twelve months; and in five cases, upwards of twelve months. In five cases, however, the life was less than a season. In some districts, the treatment lasted as long as two years; the average appearing to be about nine to twelve months, or one treatment per annum. The life of the road surface treated by tar varied considerably with the district, due to the difference in the volume and kind of traffic on the roads, whether one or two coats of material were laid on, the material used, and the character of the road.

(7) The general comments, a large number of which are given, are all of them favourable to the use of tar for the treatment of road surfaces.

The replies are followed by tabulated particulars as to the mileage of roads treated last year. The figures for surface tarring (machine and hand labour) are as follows: England, 1269 miles; Wales, 12 miles 2 furlongs; Scotland, 11 miles 5 furlongs—total, 1292 miles 7 furlongs, out of 1630 miles treated. Next come the "Dust Problem Statistics," showing what was done in each county during 1907 and 1908 to deal with the dust problem.

Upwards of 1000 copies of the pamphlet have been distributed gratuitously to road surveyors in various parts of the country, with the view of stimulating efforts to render their roads dustless during the present season; and a large number of them have expressed their appreciation of it, and placed it before their Highway Committees. Copies of the pamphlet may be obtained of the Secretary of the Roads Improvement Association, No. 1, Albemarle Street, Piccadilly, W. The selling price is 2s.

THE IMPERIAL INTERNATIONAL EXHIBITION.

The International Exhibition at Shepherd's Bush was opened last Thursday; but in regard to the exhibits, it is still in a very incomplete state. It is, however, sufficiently far advanced to say that it will be "international" in name only. Few nations, and comparatively few industries, are represented. The long and fatiguing corridor (leading from the Uxbridge Road entrance), in which exhibits were housed last year, has been completely barricaded off, several of the huge buildings are derelict, and in the Machinery Hall there is desolateness compared with last year. There appears to be as much vacant as occupied space; and the exhibits are of a miscellaneous order. There are few signs of any extension of stands beyond those already in course of erection. The whole scene is almost depressing after the well-stocked building of last year. The exhibitors there on Saturday evening really looked sorry for themselves, so neglected were they.

The rear end of the hall is splendidly lighted by the Keith new high-pressure lamps, though the electric arc lamps are still suspended there. Up to the present, there are only three or four stands representing the smoke abatement section; and the goods on view are mostly enclosed stoves for anthracite. At the stand of Smoke Consumption, Limited (Cowper-Coles patents), information is obtained of a smokeless fuel, known as "Osbornite." It is "made from coal and, in some cases, from coal and peat; is about one-third lighter than coal; and the cost varies from 25s. to 30s. per ton, according to locality." It vies with coalite in the range of its virtues. The Keith and Blackman stand, showing the latest types of their gas-compressing plant—it is the plant used

for compressing the gas consumed in lighting a large section of the grounds and the rear end of the Machinery Hall—is worth a visit by gas engineers and others interested in economical high-power lighting. The plant was described in the article on "Gas at the Imperial International Exhibition" in the "JOURNAL" for May 11. Among the miscellaneous collection of exhibits, it was noticed that Messrs. Gibbons Bros., Limited, are showing a model of their patent I. K. transporter; a few glass cases are occupied by chemical apparatus—Messrs. Townson and Mercer being among the exhibitors with petroleum testing apparatus. The illumination by the high-pressure lamps in the grounds is a feature of the night effects. The part, however, that gas is taking inside the buildings and in the grounds was described in the article on May 11; and we should only be reiterating the particulars there given by stating what was seen in the course of a perambulation through the place on Saturday.

In regard to electric lighting this year, as the "Electrician" remarks, "the great outstanding innovation is the very extensive use of high candle-power metallic filament lamps. In the majority of cases, these have displaced arc lamps; and the authorities claim that for illumination and effect much better results are obtained as the best of well regulated arcs will flicker at times." From the metallic filament lamps "it is hoped . . . to obtain a perfectly steady light, and consequently better effects."

Reverting to gas, the business that the Brentford Gas Company will do in supply this year, though there is no Gas Section, will, it is expected, owing to the additional consumption by exhibitors for power and lighting, be about on the same scale as it was last year.

It is quite apparent that the White City has quickly lost favour for industrial exhibitors; and the crowds—less dense than on a Saturday evening last year—promenading in the open, and listening to the military bands, or patronizing the side-shows, while few were examining the exhibits in the buildings, indicate that the views of the public and the original intentions of the Exhibition promoters have clashed.

A COOKER OF THE SEVENTIES.

The Old Davis and the New.

PEOPLE who might be inclined to argue—if there be any such—that a gas-cooker must be a short-lived article, would find striking proof to the contrary on paying a visit to the Queen Victoria Street show-rooms of the Davis Gas-Stove Company, Limited, where there is to be seen an object of interest which is being treated with all the respect to which its age entitles it. This is a cooker which was supplied by the firm to one of the London Gas Companies in the year 1878, and has been, presumably, in constant use for a period of about thirty years. The badge number of the Gas Company which it bears is 1035. What, we wonder, would be the number of a stove sent out by the same Company to-day? Now the cooker has been returned to the firm, who are intending to provide it with a permanent—as well as a prominent—resting place in their show-rooms. Nicely "washed and brushed up," it looks (with the exception, perhaps, of the wrought-iron ring burners) little or none the worse for its long life of activity as a "gas consumer." A comparison of this cooker with one of the firm's latest make—the Davis 1909 screwless cooker—causes one to reflect that, though in the intervening period immense strides have been made in the matter of detail, the principle on which the gas-cooker is constructed remains still to a large extent the same as it was thirty years ago; and a point which the comparison brings out is that the makers of the Davis stoves have kept in view the question of maintenance right from the beginning—there being comparatively few screws in the old type, while the position of the newest pattern in this respect is indicated by its title.

In the old stove—a No. 9 size—the outer and inner casing are of plain sheet iron; and no packing is used. The interior parts—that is, the runners in which the shelves rest—are screwed on to the body of the stove; but the sides of the oven have no screws. They are held together by corner plates. The hot-plate is fitted with three wrought-iron ring burners; and the bars over them are also of oval wrought-iron. There is, of course, not that modern convenience a simmering burner to be seen on the stove. In the latest model screwless cooker, on the other hand, both the interior and exterior casings are of porcelain enamelled steel plates—with, of course, a packing of non-conducting material, to retain all the heat in the oven. The screwless cooker is bolted together, by means of four bolts passing from top to bottom; and thus it can be taken apart and put together again in a very short space of time. The runners inside the oven are arranged to be instantaneously removable for cleaning purposes; while all parts of the stove are interchangeable, and can be replaced easily in the event of breakage, &c. The hot-plate is a lifting one, which certainly facilitates cleaning; and the burners under it are all loose, and can be removed without trouble—though they are, it should be pointed out, locked in position when the hot-plate is down.

Mr. F. E. Webb, the Deputy-Chairman of the Brighton and Hove Gas Company, left estate of the gross value of £113,724.

SUCTION GAS COMPETITION.

By W. A. TOOKEY.

THE editorial remarks appearing under the above heading in the "JOURNAL" for the 4th inst. are much to be commended. It is indeed to the interest of engineers, gas managers, and manufacturers generally that papers of the importance of that of Mr. Henry O'Connor should not merely be read before a comparatively small audience and be partially discussed by some of those who happen to be present (the majority of whom have not been able to give the contents of the treatise the study it deserves), but should be published in, and commented upon by, a widely-read journal, to the advantage of a much larger body of engineers.

It is a matter for regret that only upon very rare occasions can adequate discussion take place during the actual meeting at which such papers are presented. But it is fortunate that the reports given by the leading technical journals are, in very many cases, accompanied by a more or less verbatim account of the discussion. This is a matter in which the "JOURNAL" has merited, and has received, a full measure of appreciation from its readers; and the reputation will be still further enhanced by the adoption of the attitude taken in the leaderette above alluded to, as undoubtedly not only should competition be accepted as inevitable, but the real character of the competing object, be it man or manufacture, should be truly appraised. This can only be done by an interchange of thought, either by written word or by speech. The limits of the latter are very narrow, even within the discussion chamber itself, where the anxiety exhibited by chairman and secretary to ensure a good discussion upon technical papers is equalled only by their concern in applying the closure should, by any chance, the subject be one that presents more than ordinary interest. By the written word, however, it is not only possible to throw open the debate to a much larger body of engineers who, by their own experience, are entitled to contradict, qualify, or criticize, but such contributions give coherent expression to thought without fear of incurring the well-intentioned imposition of a time-limit; while to some the words flow from the pen much more fluently than from the lip.

As one who, while daily concerned in the application of gas power, has no financial interest either in the manufacture of engines or of gas, and therefore is unbiassed in regard to the varying efficiencies of any of the fuels that enable the advantages of gas-engines to be exemplified, the writer would ask to be allowed to respond to the implied invitation in the "JOURNAL," and offer some comments upon town gas *versus* suction gas competition from the point of view of a gas-power specialist.

There are two main considerations—suitability and cost—that have to be taken into account by a manufacturer or his consulting engineer when making a decision in favour of one or the other fuel. There can be no question at all that town gas is the gas *par excellence* for engine work. It is eminently suitable in composition, cleanliness, uniformity of quality, convenience, and constancy. It requires less capital outlay, less attention, less water. It gives more power per unit of cylinder capacity, can be obtained at a moment's notice, and all stand-by losses are avoided. But, notwithstanding all these good qualities, suction-gas competition exists. Suction gas is a suitable fuel, but needs all the above merits to be qualified. It is suitable in composition if special provisions are made as to compression of working charges and their ignition. Its cleanliness is not to be compared by the same standard as the purified gas used for illumination; and special precautions have to be taken to prevent the inlet valves becoming inoperative through deposits of tar. Variation of power entails variation of quality; while even the continued operation of the producer tends to decrease the quality of the gas. Its convenience is great when compared with steam plants; but town gas far excels it in constancy and ready application. All items of running costs are higher, as well as the increase in capital expenditure; while any great variation in quality of the solid fuel burnt ofttimes leads to irregular and unsatisfactory working.

Why, then, is the competition so keen? And why do so many consulting engineers advise their clients to adopt suction gas in preference to town gas? The answer is that the cost of town gas is, as a rule, prohibitive for all but small engines, or those of larger power which are used for short and intermittent periods. Adopting the basis that one brake-horse-power can be developed for the hourly expenditure of 10,000 B.Th.U., 77 cubic feet of suction gas is thus accounted for if at 130 B.Th.U. per cubic foot, or 16·66 cubic feet of town gas of 600 B.Th.U. per cubic foot—the latter representing 60 B.H.P. hours for 1000 cubic feet, and the former 60 lbs. of anthracite for the same output and period. The two fuels can therefore be compared in terms of such relation as follows:—

Town gas at 1s.	per 1000 feet	=	60 lbs. of anthracite at	37s. 6d.	per ton.
,, ,, 1s. 6d.	,, ,,	=	,, ,,	,, 56s.	,,
,, ,, 2s.	,, ,,	=	,, ,,	,, 75s.	,,
,, ,, 2s. 6d.	,, ,,	=	,, ,,	,, 93s.	,,

Of course, the actual costs, including water and labour, &c., reduce the discrepancies between the ruling prices according to locality and individual applications. An idea of this reduction may be obtained by assuming that attendance, water, depreciation, &c., can be assessed for a 60 H.P. plant at about 1s. per hour, and that wastage of coal, through dust, careless feeding, defective manipulation, unconsumed fuel in the ashes, stand-by losses, &c.,

increase the consumption of fuel by 25 per cent. This would give the corrected figures as under:—

Town gas at 1s.	per 1000 feet	=	anthracite at	29s.	per ton.
,, ,, 1s. 6d.	,, ,,	=	,, ,,	44s.	,,
,, ,, 2s.	,, ,,	=	,, ,,	59s.	,,
,, ,, 2s. 6d.	,, ,,	=	,, ,,	74s.	,,

The advertised statements of gas-engine makers, as to the cost of power with suction gas being from 50 to 80 per cent. of town gas, may be thus explained.

But, after all, there comes the question of reliability. What would be the good of a manufacturer trying to economize his working expenses if the saving involved risk of stoppage or possible damage of material in process of manufacture through unreliable working? Instances have been known where suction-gas plants have been discarded owing to the constant recurrence of breakdowns. Scores of apparatus can be started only with difficulty. The number of stand-by services provided by the public supply mains is quite considerable—pointing either to a deeply-rooted feeling of distrust or a laudable desire to have a duplicate service in case of emergency.

On the other hand, it must be admitted that the majority of suction-gas installations are doing excellent service, even when there is no town-gas service available for occasional aid, both with regard to reliability and economy. Why this difference? It is purely and simply a matter of education. Makers have acquired a very considerable amount of experience during the last five years, and erectors are beginning to be taught that more than half of the difficulties encountered in connection with suction-gas apparatus would be avoided if they paid as much attention to the piping arrangements as their employers do to the design of the engine. A properly-planned suction-gas installation gives no trouble either in starting or in working. Wet sparking plugs are practically unknown, and the scrubbing arrangements are efficient enough although of but a simple character. There is absolutely no reason why any suction producer plant should not give every satisfaction; and the fact that a number have been abandoned shows incompetence of the erector rather than defects of apparatus.

Gas managers, therefore, should not look upon present suction-gas producer troubles as likely to be always existent, nor repeat —parrot-like—that three plants in Glasgow have been thrown out. By doing so they run the risk of lulling themselves into dangerous lethargy. The simplicity and economy of the suction-gas system has given it a great impetus; widespread application and general education with respect to the arrangement and connection of detail parts will do the rest; and in due time the competition between the two gas-engine fuels will be non-existent, because the sphere of each will be more clearly defined. Town gas will hold the field for small powers up to about 20 H.P., and probably in some circumstances to 30 H.P. For larger powers it would only be financially possible for intermittent work, such as electric lighting in business premises, for storm water pumping schemes, and similar duties, at rates at the present time ruling in the majority of districts. From 30 H.P. to 100 or 150 H.P. suction-gas producers will be installed in the large majority of instances. Between 200 and 500 H.P. gas-engines will perhaps hold their own when bituminous coal is gasified instead of anthracite; but at present there is a vast field in which the advantages of steam are as paramount as those of town gas for small powers and intermittent work. Each method of power production has its own advantages and disadvantages; and it is doing a disservice to general progress to attempt to distort the natural limitations of each type of apparatus. Efforts should rather be directed to encourage the application of each in its own proper sphere; and this can be done for town gas by gas managers in many ways.

Mr. O'Connor's remarks as to the desirability of utilizing the service mains for power supply during the hours when the demand for illumination is at a minimum, should sufficiently indicate the possibility of lowering the rates to an amount which would bring increased profits, notwithstanding low rates, seeing that distribution and collection charges are but slightly increased, and that therefore a fair profit above the actual cost of manufacture would be distinctly remunerative. Upon such matters, however, the experience of others must be brought to bear. The methods to adopt for encouraging the use of town-gas engines are more within the ken of the present writer. With the facilities possessed by gas companies' inspectors, of ready access to manufacturing premises, it cannot be denied that every opportunity presents itself for a responsible official to become acquainted with the methods of power generation in use. When separate steam-engines are utilized, working at boiler pressures less than 80 lbs. per square inch, fitted with ordinary slide-valves and non-condensing; when the exhaust steam is practically wasted by being turned to no useful purpose; and when little or no heating is required for the industrial processes—very little inducement should be necessary to effect a change from steam to gas.

Permission should be sought for a test to be made to determine the average output of power throughout one whole day, in order to check the consumption of fuel and water in terms of indicated horse power. Indeed, no gas-engine should ever be put into service to replace any other form of motive power until such a test has been conducted to prove the normal and maximum load; for it is as desirable to have an engine large enough to deal comfortably with its load as it is necessary to avoid putting down a much larger engine than is actually required. In the one case, the engine would always be likely to breakdown through overload temperature; while, in the second case, frictional losses of engine and transmission gear would be disproportionate to the average load, and compare badly with competing prime movers.

There is a very fruitful field for town-gas power service in the generation of electricity for the lighting of large business premises, drapers, grocers, hotels, &c. There are many openings for such installations in every large town; and, if proper attention be given to the efficient silencing of exhaust without back-pressure, such applications generally lead to an extension of this class of business. The personal influence and advice of a competent gas-power expert in the service of a gas company will usually prove just the one thing needful to turn the undecided proprietor into a large consumer.

Even in factories where a small quantity of steam is required for boiling and heating, gas power can make a good showing. For heating printers' stereotyping presses, bookbinders' presses, glue-pots, roller-composition melting pots, type cleansing, &c., to mention some of the applications of steam in one particular industry only, a very little steam can be made to go a very long way by generating it at low pressure in a small gas-fired boiler, conveying it in small pipes to the machine or process, and imparting a further supply of heat by means of a ring gas-burner immediately before use. It is astonishing to realize the economy of such a system, to say nothing as to the convenience and the cleanliness.

In this connection, reference may be made to such a system schemed by the writer for a firm of printers in London. A weekly publication was printed from stereotype plates, necessitating steam for heating the press used for drying the *papier maché* moulds. When a gas-engine was put down to drive the general printing machinery, the coal bill of 5 tons per week was reduced to 1 ton, *plus* 25s. for the gas used in the engine. The installation of two small gas-fired boilers with superheaters has now not only wiped out the coal bill altogether for an additional 3s. worth of gas weekly, but has done away with the necessity of making steam and keeping it, by constant stoking, for twenty-four hours. The processes are now interdependent, and can be operated at any time at five minutes notice; whereas, before the change, the steam was only available one day a week and everything had to be accumulated for the "weekly clear-up."

As for printers, so for laundries; for the coal fired boilers in use at the latter, especially in the smaller concerns, are usually hard pressed, and gas power gives a welcome relief. Besides this the steam generated can be much more efficiently used for boiling and washing than in a steam-engine, which allows so much of the heat in the raw coal to escape in the exhaust unused. The variations in steam pressure, due to the drawing-off of large quantities of steam and water at frequent intervals, often affect the power and speed of the engine. Gas, again, can be used for the ironing department if the admixture of gas and air is once properly set and made unalterable, and the pressure controlled. These things can be done, and should be done, but by a department separate from that of the ordinary inspector, whose multifarious duties in connection with illumination, heating, and cooking are well-nigh too much already. There should be a gas-power department under the supervision of an engineer skilled in such matters, who can make it his business to get into personal touch with all consumers of gas for industrial purposes, and give expert attention to each installation at intervals, to ensure maintenance of proper working conditions.

By thus encouraging and assisting proprietors of industrial concerns, gas managers will do more towards securing their full share of the power business than in seeking opportunities for decrying the performances of competing fuels and pouncing upon all reported failures, which, after all, show only a lack of intelligence on the part of those who are responsible for their erection and selection.

A Plea for Gas-Stoves.

At a meeting of the Royal Institute of British Architects on Monday last week, the subject of "Smoke Abatement" was debated at some length, on a paper read by Sir William Richmond. One of the speakers was Dr. H. A. Des Vœux, who urged architects to take up the question of cooking in private houses, and to recommend the use of gas. He expressed the opinion that, if architects brought their enormous influence to bear in this way, there would soon be an improvement in London. If they began with gas in the kitchen, he was perfectly certain people would follow by using it upstairs. He was a strong believer in gas for heating houses, and especially bedrooms. There were now 500,000 gas-stoves in London; and if gas was as deleterious to health as some people thought, they would have heard of its effects before this. Sir Aston Webb said that having recently, owing to illness, been compelled to have a fire in his bedroom, he was convinced that a gas-fire was preferable to a coal-fire, which when poked, disturbed the patient.

Sir John Colomb, one of the Directors of the Commercial Gas Company, underwent a very serious operation at his London residence on Monday last week. His progress was at first as favourable as could be expected. Unfortunately, however, later in the week his condition gave cause for great anxiety; and on Sunday it was still extremely grave.

THE MIDLAND ASSOCIATION IN THE POTTERIES DISTRICT.

THE President of the Midland Association of Gas Managers (Mr. W. Langford) being professionally centred in the Potteries district, to the Potteries district the members went for their May outing last Thursday. For pleasure it is usual to turn one's back on the seats of industry; but, in this instance, the members of the Association went into the very heart of industry for pleasure, and found it. Wherever they turned from noon on Thursday until they left Longton, they saw they were in one of the great workshops of the country. But they found that the men who are of the chief spirits of the fecund enterprise of the Potteries are not so absorbed by their business affairs that they do not know how to welcome and give pleasure to those who visit them. In the generous hospitality and the provision for the day's interest and conveniences, not only was the kindly disposition of hosts represented, but the worth and esteem in which the President is held in Longton was reflected. The chief host of the day, who made himself personally responsible for much, was the venerable Mayor (Alderman Aaron Edwards, J.P., C.C.), who won the hearts of all the visitors. Of him, Longton is proud. He is one of the mainstays of the borough. He is one of the men who has helped to lay the foundations, and to rear the structure, of England's industrial greatness; and the visitors recognized it. It was regretted greatly that ill-health prevented the Chairman of the Gas and Electricity Committee (Mr. Alderman E. Brookfield, J.P.) from being present, but the Vice-Chairman (Mr. W. Hulse, J.P.) was of the party throughout the day, as were also, we believe, the whole of the other members of the Committee. The names of the members of the Committee other than those just mentioned are: Aldermen A. B. Jones, J.P., and T. Potter, and Councillors A. Brookhouse, J.P., E. J. Brewer, J. W. Beswick, T. Copestake. T. W. Davis, W. C. French, W. Machin, J.P., A. H. Proctor, R. S. Robinson, J.P., W. Reid, and W. J. Taylor. Among the guests were Mr. J. W. Morrison, President of the Manchester Institution, Mr. W. Prince, Past-President, and Mr. John Young, President-Elect of the Eastern Counties Association. The greater number of the members, accompanied by the Hon. Secretary (Mr. Harold E. Copp), left Birmingham soon after nine o'clock; and by noon were assembled at the Town Hall receiving the hearty welcome of the Mayor. Few were his words, but there was a hearty ring about them. The mouthpiece of the members in acknowledging the welcome was Mr. Samuel Glover, of St. Helens. Then his Worship invited the members to take light refreshments with him in the reception room, before entering upon an inspection of the gas and electricity works.

THE HOST OF THE DAY.

There was one remark made by Mr. Glover in the acknowledgment referred to above that happily and aptly links together the Mayor and the industry of the district. "Where there are chimneys, there are men; and where there are men, there is, as a rule, a mayor." It will be interesting to the fifty or sixty members of the Association, the recipients of so much kindness at the hands of his Worship (who took such an imposing part in the day's outing, despite the fact that he has by some years passed the three score and ten years' span), if we put on record here some particulars of the main features of his long public and surely, in respect of the years of mayoralty, unique career. To do so, however, we must transfer to this part of the day's record from the speech made by Mr. Charles Meiklejohn, in proposing his Worship's health at the dinner in the evening, some of the interesting details of which he made use.

Alderman Edwards is now in his forty-first year of unbroken service as a member of the Longton Town Council, of which body he has been an Alderman since 1875. For 25 years he has occupied the position of Chairman of the Sanitary and of the Rate Appeal Committees, besides which, during his membership of the Council, he has taken an active share in the work of the other chief Committees. Alderman Edwards was first elected to the office of Mayor of his native town in 1874, since when the Council have honoured him by electing him to the office on no fewer than six occasions—the present being his seventh year as Longton's Chief Magistrate. He has always taken his mayoral duties seriously; and, recognizing the obligations of the office, he has devoted himself unstintedly to its duties, and most worthily upheld its traditions. Both his personal service and his private purse have ever been at the call of any movement whether philanthropic, educational, or social, that was for the good of the town or its inhabitants. For instance, in his mayoralty of 1896-7, when he followed the Duke of Sutherland in the chair, it was owing almost entirely to his own individual effort that the building of the handsome and spacious Technical School and Public Library was able to be begun, towards which he not only himself gave a very generous donation but also secured no less a sum than £7000 towards the building fund. The foundation stone was laid on Jan. 7, 1897, by the King (then Prince of Wales) with full Masonic honours, on which occasion Mr. Edwards presented His Royal Highness with a handsome mallet and trowel as a memento of the event. Later in the same year, he entertained the whole of the school children and teachers in the borough to tea in the Queen's Park, in commemoration of the Diamond Jubilee of the late Queen. Another memorable year of office was that of 1899, when the Sutherland Institute was formally opened by the Duke of Sutherland, accompanied by the then American Ambassador (Mr. Choate), and a large house party, whom his Worship afterwards entertained at a banquet in the Town Hall. Each year of office has been marked by some special act of hospitality or generosity; and the present one will be no exception to the rule, for Mr. Edwards is completing the façade of the Sutherland Institute by the gift of a large entablature in terra cotta, designed to illustrate the staple industries of the town. He has for many years taken a large share in the judicial and magisterial work of the borough and county. It is now thirty-four years since he was placed on the Commission of the Peace for the borough, and some fifteen or sixteen since his name was added to the County Commission. In 1907, Mr. Edwards was elected as a member of the Staffordshire County Council as a representative of one of the Longton electoral divisions; and he is now an active member of several County Committees. In addition to the above, he has been Chairman of the Potteries Stipendiary Commission for the last seven years; and for some time past has acted as an income-tax commissioner for North Staffordshire.

INSPECTION OF THE GAS-WORKS.

The gas and electricity works of the borough, both of which stand on one site, and are under one Committee and one Engineer (Mr. Langford), are but a few minutes' walk from the Town Hall. They are of interest, apart from what is seen there, from the fact that Longton is one of the six towns to be federated in March next; and the existing municipal undertakings will then come under the new authority. But the Longton works, of course, only were under the inspection of the visitors on Thursday, and not the others. To anyone who visited the works a number of years ago, and entered them again after a long absence on Thursday, the change for the better that has been effected on all hands is very marked. Mr. Langford has been in office some ten years; and his conscientious regard for duty is shown in the works and in the financial and working statements. As a prelude to the description of the works, it may be mentioned that the undertaking was purchased from a private Company in 1878, at which time the make of gas was 65 million cubic feet, and it is now 155 millions; the population supplied being about 34,000. In the last published accounts, for the year ending March 31, 1908, it is seen that the total quantity of gas made was 154,450,000 cubic feet, of which 9,402,000 cubic feet were water gas. The quantity of gas sold to private consumers was 125,619,000 cubic feet; sold for public lighting, 20,070,000 cubic feet; used on works, 1,737,000 cubic feet, and unaccounted for, 7,024,000 cubic feet—the last figure equalling 4·5 per cent. of the gas made. The quantity of coal carbonized was 11,765 tons; the gas made per ton, 12,328 cubic feet; sold per ton, 11,630 cubic feet; coke made, 7647 tons; coke made per ton of coal used, 13 cwt.; coke sold, 6441 tons; used for retort fuel, 916 tons; per cent. of make used for retort fuel, 12·1; used for water-gas manufacture, 196·5 tons; used on works, 93 tons; oil used for water gas, 20,454 gallons; oil used for water gas per 1000 cubic feet, 2·17 gallons; average price of coke sold, less labour and carriage, 11s. 4·7d.; sulphate made, 138·1 tons; sulphate made per ton of coal, 26·29 lbs.; and tar made, 746·5 tons. These working results will have a peculiar interest for many gas engineers.

Some of the visitors inspected the offices, laboratory, &c. Then all walked to the retort-house, taking the other features of the plant *en route*, ending up at the electricity plant. We will briefly describe what was seen, with remarks on notable points.

Lingering for a few minutes in the laboratory, it was seen that it is of ample dimensions, and well fitted with instruments and apparatus for conducting the great variety of chemical tests necessary for securing the best returns from the materials used. Outside the offices, Mr. Langford (who by-the-by was admirably aided by his assistants—Messrs. Tom J. Noden, F. Leak, C. Cuthbertson, and C. Leese, Foreman—in explaining the features of the works) pointed out that they have been so planned that extensions can be made in parallel lines with existing plant northwards, so that the general appearance of holders, purifiers, and retort-houses in straight lines is very pleasing to the eye, and, while the land is fairly well covered, there is no feeling of being cramped for want of room. Most of the buildings are in plain brickwork of local make, and suitable for an atmosphere somewhat charged with smoke.

AN ARTISTICALLY DESIGNED BUILDING.

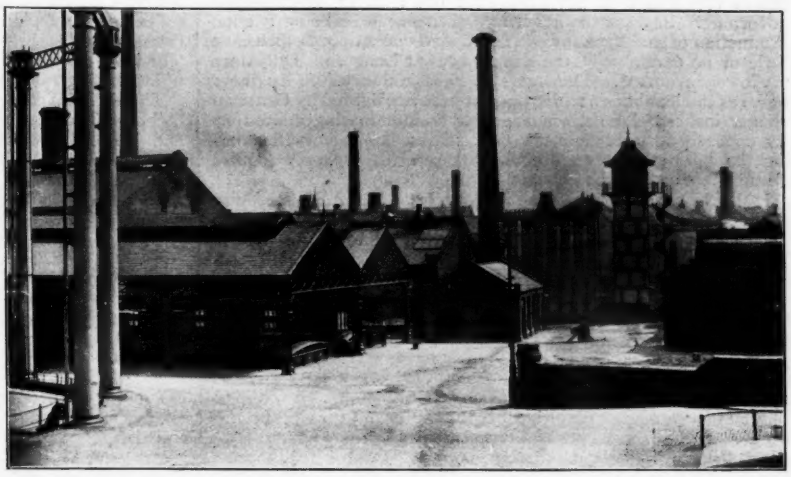
An exception as to plainness of style is found in the new engine and exhauster room, which was erected last year. It is of Mr. Langford's own design, and classical in its conception. We congratulate him upon it. The front facings are composed of Ruabon terra-cotta; and it is an interesting example of a room splendidly lighted, although there are windows only on the one side. The body of the room is lined with white glazed tiles, which reflect light on each side, while the dado, 5 feet high, is composed of beautiful green tiles. The frieze is of ivory tiles, relieved with green. The ceiling is of panelled pitch pine and varnished, fitted with three ventilators, in which expanded metal is used, and from the centre there is suspended a cluster Graetzin lamp. The floor is also neatly tiled in red, black, and buff. Excepting the tiling, all the work was carried out by the department's own men. One interesting feature in the room is an old engine that

was scrapped some years ago. This has been cleaned, fitted together, put into working order, and on the end an air-compressor has been placed, and the compressed air is found very useful for painting holders, raising liquids, &c. Compressed air is always a valuable agent on a gas-works. The engines and exhausters (Gwynne's and Beale's and Waller's, and in duplicate) are kept in perfect condition; the cylinders being cased in blue steel lagging.

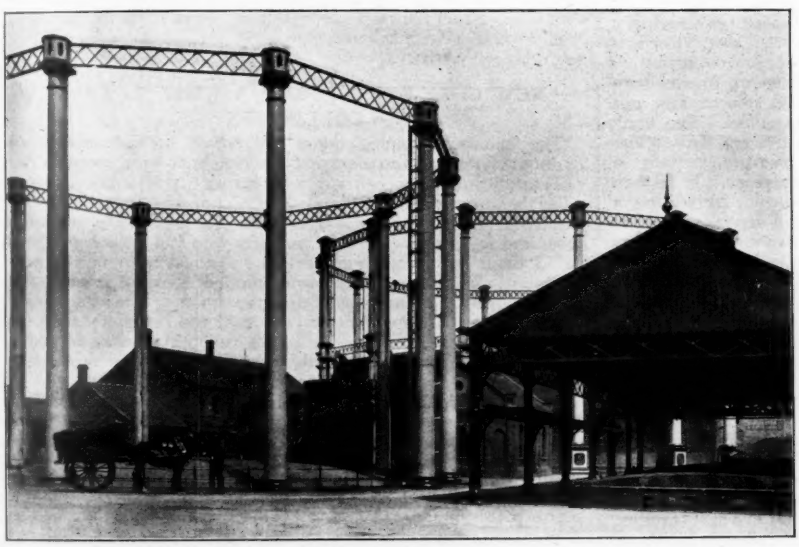
Provision has been made for future extension when necessary. New workshops, show-rooms, and stores have recently been erected—comprising on the ground-floor a well-equipped smithy (fitted with an electric motor for blast purposes), stove and fitting shop, general stores, carpenter's shop, and storekeeper's office. Upstairs are fittings and stores, show-room, meter testing room, and meter stores. Each room is admirably lighted and well ventilated.

Purifiers and Purification.

We are following the plant in irregular order, as it happened to come under observation. The purifiers, it was observed, number six, 24 ft. by 22 ft. by 5 ft., covered with a substantial shed, which has been extended during the last two years, to enable oxide to be revivified in wet seasons, with which the Potteries have a good acquaintance. Purification costs have been much reduced by splitting up the gas in each purifier—one half of the gas going through the top layer of oxide, and the other half down through the lower layer. By this method, the oxide is more equally charged with sulphur, and the purifiers are not changed so often—one purifier, on an average, passing over 100 million cubic feet before being changed.



Longton Corporation Gas-Works—A General View of the Plant.



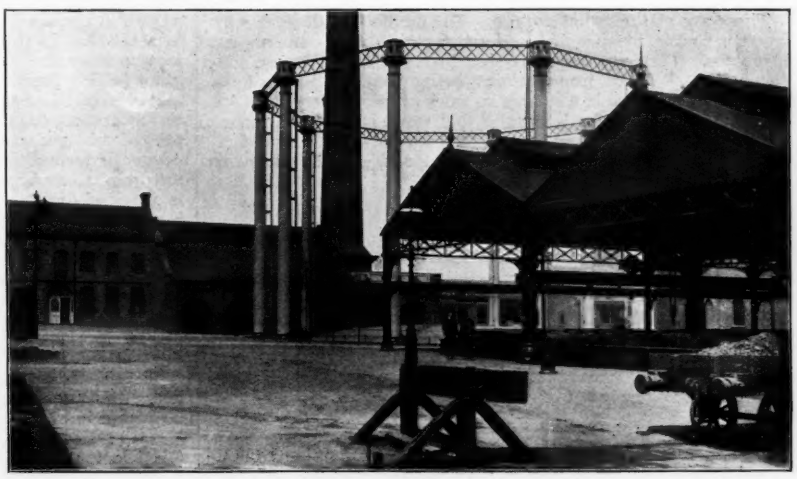
In this Second View of the Plant, the Works' Offices are seen in the Rear.

Carburetted Water Gas and Retort-House Operations.

A description of the Humphreys and Glasgow carburetted water-gas plant on the works was given in the paper read by Mr. Langford before the Gas Institute in June, 1901. It comprises two sets, each of 300,000 cubic feet capacity per diem. Since the reading of the paper, a steel platform, raised and lowered by hydraulic power, has been erected, communicating directly with the retort-house floor, so that hot coke can now be run direct into the generators; thus getting an extra 10 per cent. duty and a saving in labour costs. Ordinarily, about 10 per cent. of water gas to the total production is made; but Mr. Langford changes the proportion to suit the market conditions. The carburetted water gas is now taken by a 6-inch main into the retort-house, and by 4-inch pipes along either side of the settings, from which 4-inch pipes, through 1½-inch tubes (each fitted with a cock for facility in regulation), the water gas is admitted into the hydraulic main, and travels thence with the coal gas through the condensers, &c.—thus ensuring perfect mixing, and no possible chance of the gases stratifying. Mr. Langford believes that this practice accounts for his low oil account, and that the water gas by its admission to the hydraulic main picks up some portion of the hydrocarbons of the coal gas that might otherwise be lost to the gas.

The retort-house, which is very light and airy, is on the stage-floor plan, with horizontal retorts and regenerative settings. Formerly there were nine retorts per bed; but the ninth has for some years been discontinued. They were also formerly stopped in the middle. The divisions have been removed; thus making through beds, and preventing much loss through undue scurfing and other defects. The retorts are now set in eights, two outside tiers of three, and a central one of two. The house can easily be extended when needed. The old retort-house has been constructed into a coal-store, containing at present 1000 tons of coal, while a third portion is partitioned off for the carburetted water-gas plant.

Carbonizing results and other particulars were given in the President's address as recorded in the "Journal" for March 9 last. But we may say here that it was noticed that the heats were high, that comparatively light charges are used (hardly 3¼ cwt. per mouthpiece), and that the charges are five-hour ones. The make of gas per mouthpiece is about 9300 cubic feet—at all events that was the figure for one day last week; and the make per ton averages 12,300 cubic feet. The figures quoted earlier in this account shows the quantity of gas per ton that the department is



The Background to this View shows the Electricity Generating Station and Boiler-House and Shaft.

[The extension of the Plant this year will bring the frontage of the Generating-Room in line with that of the Boiler-House.]

actually paid for. West's manual chargers and rakes still do excellent duty. It was remarked that two 8-inch Parkinson and Cowan governors are used, one at either end of the retort-bench; and the gauges on the walls show the level pressure conditions that are maintained through their use. Away at the exhauster-house, the steam is governed, but there is no intermediate governing. Besides the governors assisting in realizing a good production of gas, Mr. Langford mentioned that stopped pipes have little or no part now in the experiences at Longton. Dillamore tar-towers are used. The house is light and airy (the Engineer believes in cleanliness); and at night time are lighted by Graetzin cluster inverted lamps, which, so far as illuminating conditions are concerned, turns night into day. These lamps, notwithstanding the unpropitious conditions of a retort-house, only require cleaning about once a fortnight.

It should be mentioned here that nearly all North Staffordshire coal is used at Longton. It is brought direct into the works from the railway on sidings flanking either side of the retort-house. Through bottom doors in the waggons (which are the Committee's own property), the coal is dropped into covered coal-breakers, and elevated to the coal-hoppers in the retort-house. When the hoppers are full, a side shoot sends the coal into the coal-store. There was some question as to whether the lifting of the coal for store was economical; but the answer is that hand labour for putting into store would be more expensive.

In the basement of the retort-house, an old pump was noticed which is used for pumping water from the brook running by the works. For works purposes, by this means, water costs practically nothing. The two Lancashire boilers, 27 ft. by 7 ft., supply steam for all works' purposes, and are fitted with Wilton's patent furnaces.

Breeze and Coke.

The visitors noticed the entire absence of breeze on the works; and the reason adduced in reply to inquiry is that none is made, through every care being taken not to handle the coke. For this purpose, a coke bank, made up with rubbish and brick-paved on top, has been built at the end of the retort-house on a level with the charging-floor, which is 9 ft. 6 in. above the railway metals, and on a level with the top sides of railway coke-trucks. The bank is the same width as the end of the retort-house (74 feet). The coke is drawn from the retorts into iron barrows, varying in height suitable for the bottom or upper mouthpieces. It is then run outside to the coke-bank, cooled there, and, by pulling a lever, the bottom of the iron barrow opens, and deposits the coke on the bank. The coke is then pushed over into the railway waggons or carts as required, and is practically free from breeze, unless at the times when coke is thrown from the top of the bank for storage purposes. While speaking of the despatch of residuals, it may be said that, in sending away surplus tar, the tar-pumps deliver it direct into 14-ton railway tanks.

For some years efforts have been constantly made by Mr. Langford to obtain a local demand for coke. Formerly the greater bulk had to be sent into other districts; thereby giving annoyance to other undertakings and at the same time injuring their coke markets. The tables are now turned; and at least 90 per cent. of the coke sold is used locally. It is found that a mixture of coal and coke for the firing of potters' ovens, especially in the early stages, is a great benefit, although more is paid for coke than for coal. Speaking of potters' ovens, the President has still standing the one upon which he made the experiments detailed in his Presidential Address. He has not yet been able to pursue the trials.

Sulphate of Ammonia Works.

These are of the ordinary type. The method of dealing with fumes is simple, inexpensive, and satisfactory to the Government Inspector. The fumes after passing through condensers are conveyed into oxide of iron without being confined in purifiers. Then when the heap is too large to work properly, the fumes are diverted by the use of a hydraulic seal valve into another spare heap of oxide, and the foul heap is then spread out for revivification. This system has been in operation for nine years, with very satisfactory results.

Miscellaneous Items.

Before leaving the gas-works, there are two or three miscellaneous items deserving record. Since Mr. Langford has been in charge of the works—ten years—the number of consumers has been increased from 3500 to about 6700. The price of gas has been reduced from 3s. 4d. per 1000 cubic feet to 2s. 6d.; and the contribution in aid of the rates is now £3000, against £500. No additions have been made to capital account. The carburetted water-gas plant, railway waggons, and general additions have been paid for entirely out of revenue.

The Electricity Works.

Introductory to a brief reference to the electricity plant, it may be said that the Corporation in 1897 received notices from two private Companies of their intention to apply for Provisional Orders, to authorize them to supply electricity within the borough. The result was that a Provisional Order was applied for, empowering the Council to provide their own works and plant. The Gas Committee were appointed to act for both undertakings; it being thought desirable that the administration of the two works should be by the same Committee, and under the one management. Mr. Langford thereupon reported on the site, and finally prepared the plans of the buildings and machinery. The then existing workshops offered the only available site allowing of future extensions; and this was utilized. The works were opened in October, 1901, and have since been under the same Committee, management, and staff.

The growth of the output of electricity has been gradual; but, during the past year, the increase has been such as to necessitate an extension of plant. An extra 300 kilowatt generating set is in consequence to be installed, and the generating room enlarged. The interior walls of the generating room are a beautiful example of local tiling work, with arches of exquisite faience tiling.

The existing plant consists of two 150 kilowatt sets, driven by high-speed compound engines; steam being supplied by Babcock and Wilcox tube-boilers, fitted with chain-grate stokers. The chimney stack is a feature. It is 156 feet high, with 6 feet clear shaft right through. It stands on a 25¼ square feet base, of 13 feet solid concrete resting on railway metals, laid grid fashion, so that it cannot shift. The battery is by the Chloride Electrical Storage Company; and the mains are laid solid on the Callender principle. Current is supplied for lighting on the maximum-demand principle of 8d. and 2d.; or customers may choose a flat-rate of 6d., less 5 per cent. Current for motive power is supplied at from 2½d. to 1¼d. per unit, according to quantity. The works for the year ending March 31, 1908, earned a profit sufficient to pay interest and sinking fund charges, and leave a net profit of £20.

Incidentally, Mr. Langford remarked that one of the advantages of running electric works under one Committee, one staff, and one management is that there is no occasion to conduct competitive canvassing. There are the supplies. Consumers can havewhich they require. For instance, customers are not canvassed who already use gas-engines, and urged to use electric motors. The change would entail the cost of a new service and main, and but little profit, if any, in the end; while there is a profit in the gas supplied for power. The finances of the town are benefited in this way. From the engineer's point of view, however, the electricity works give much more trouble and cause more anxiety than the gas-works.

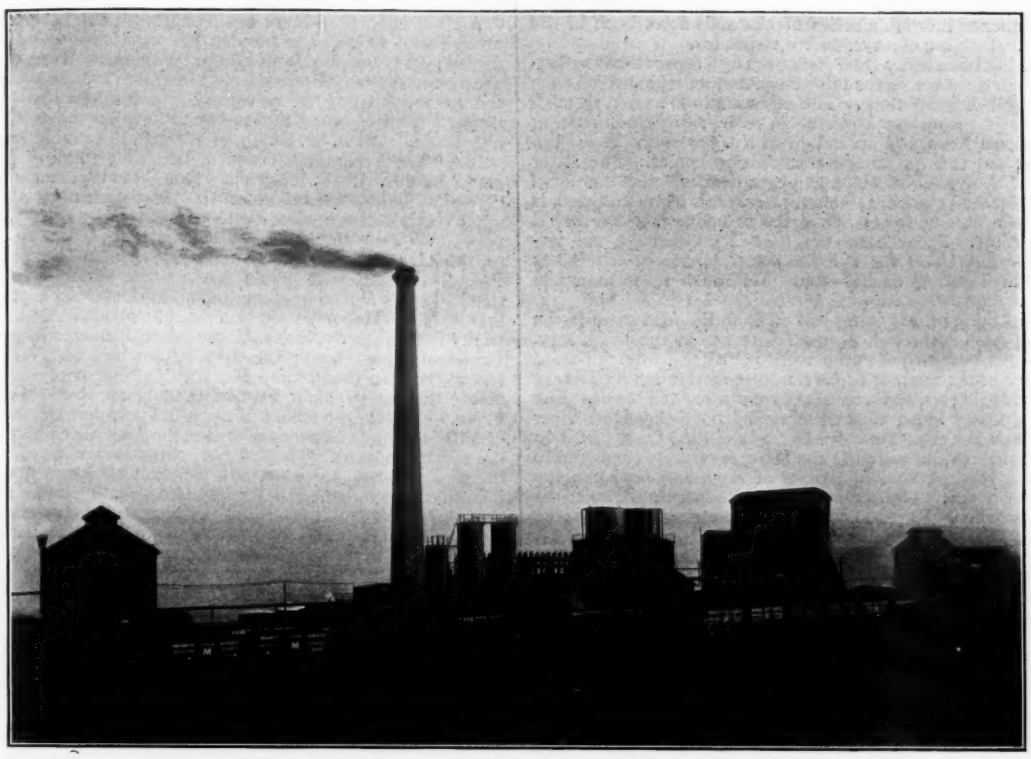
NEW COKE-OVEN PLANT AT THE APEDALE COLLIERIES.

The members, having taken the cream off the interesting features of the gas and electricity works, bent their steps to the railway station, whence a special train was to take them to the Apedale works of the Midland Coal, Coke, and Iron Company, Limited. They were not long covering the distance between the town and the property of the Company, who had, by request, provided them with what was to many a novel item in the programme. To say that coke-oven practice does not interest the gas engineer is to say something that is not true; the eager manner in which inspection was made of the complete plant for dealing with coke, gas, and residuals, and the manner in which inquiries were pressed during the inspection were the manifestations of an intense interest and pleasure.

On the Midland Coal and Iron Company's own railway sidings, hard by the new coke-oven plant, the special train pulled up; and there to meet the visitors were the genial General Manager (Mr. William Hill), Mr. W. Barber, Chief Colliery Manager, Mr. J. Cook, Chief Engineer, Mr. W. Surtees, Manager of the Works, Mr. Withers, Mr. Slaney, Mr. Lowndes, and other members of the staff.

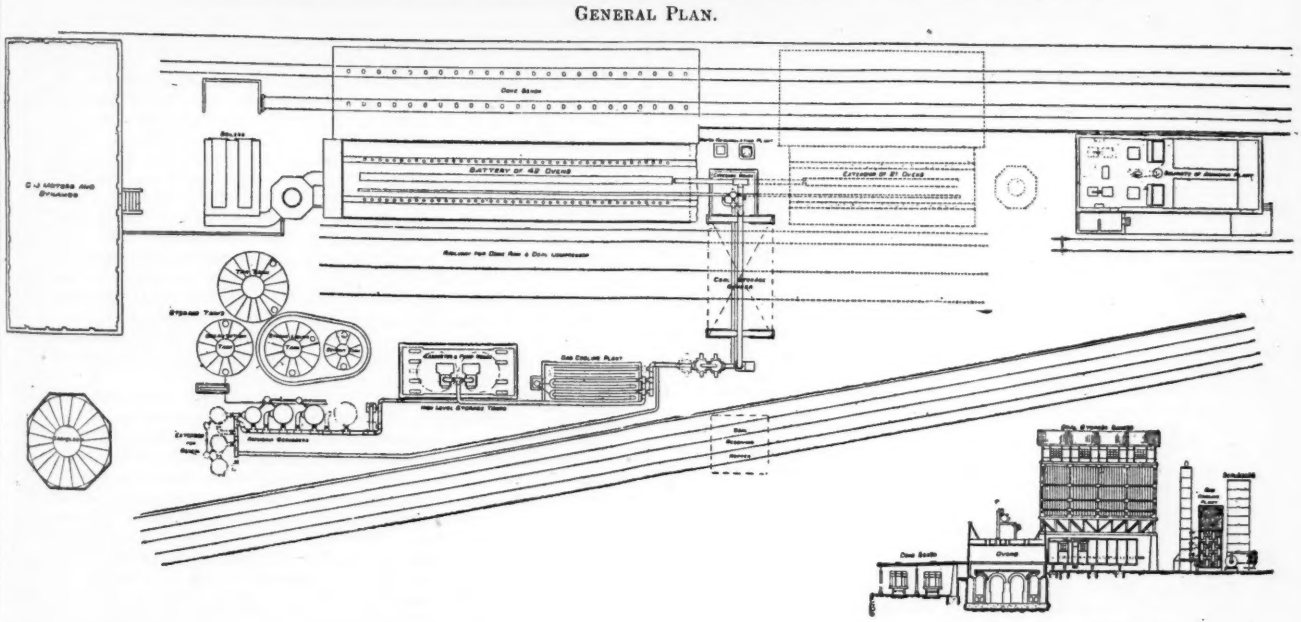
The members learnt a great deal about coke-oven working through the aid of these gentlemen before they left the place. Formerly coking was done in "Beehive" ovens situated in close proximity to the blast-furnaces, and distant about half-a-mile from the Apedale group of collieries, where the central washery is installed. The whole of these have, however, been put out of service since the new coke-oven plant was started. This new plant (which, together with the auxiliary machinery, was supplied and erected in its entirety by Messrs. Simon-Carvès, of Manchester) at present consists of 42 coke-ovens of a total capacity of 1000 tons of coke per week, together with bye-product plant for the recovery of tar and ammonia, and the transformation of the latter into sulphate. At present, the benzol is not recovered; but space is provided for the necessary plant when the price of the product is such as to warrant the initial expenditure. Provision is made for considerable extensions without in any way interfering with the general lay-out of the plant, or necessitating additions to auxiliary machines, which are all installed in duplicate, providing at the present time a stand-by in each case. The whole installation, down to the smallest detail, constitutes an excellent example of a modern coking plant, and, so far as it has been carried, a bye-product plant also.

The general arrangement is very compact. Coal is brought by hopper-bottomed trucks from the washery, and discharged through a grating into a hopper at the ovens, from which hoppers it is raised by a bucket elevator to the storage bunker. The elevator (electrically driven by a 35-horse power Westinghouse motor) is fitted with sliding doors to permit the coal being discharged into any portion of the bunker, which has a storage capacity of from 500 to 600 tons. The bunker is carried on a strong bridge structure built over the ram and compressor rails, with a clear span of 52 feet. This will enable the ram and compressor to pass underneath to the extensions to be added later on. From the storage bunker, the coal is fed through slides to the charging-machine. The stamp for compressing into the charging-box the slack to be pushed into the ovens is electrically driven by a 10-horse power Westinghouse motor. The railway for the stamp



General View of the Coke-Oven Plant at the Apedale Collieries of the Midland Coal, Coke, and Iron Company, Ltd.

GENERAL PLAN.



ELEVATION.

is a departure from the usual practice—being carried on the bunker instead of on the charging-machine. Current for operating the stamp is taken from three overhead naked wires.

The charging-box and ram are fixed upon one frame running upon four lines of rails, the ram being fitted with a tilting tail-end to enable it to clear the bridge carrying the coal-bunker. The charging-box, which has a capacity of 10 tons, travels in front of the oven to be charged, and the front of the box is removed. One of the sides is then eased back by means of a hand-wheel working on a worm-and-pinion. The compressed charge then rests upon the "peel," by means of which it is fed into the oven. The back of the peel is drawn back, the oven-door closed and wedged, the peel is drawn out, and the charging operation is then complete. All the motions of the peel, ram, and travel of the machine are operated by a Westinghouse 40-horse power motor, by means of disengaging clutches, which are conveniently placed in the motor-house above the ram. In the event of the mechanical charger being, from any untoward circumstance, put temporarily out of action, provision is made for charging the ovens from the top by means of hoppers, and levelling by hand.

The ovens are of the Simon-Carvès 1906 type, with regenerators, and specially designed to produce the maximum amount of surplus gas possible. The surplus is shown by actual measurement to amount to 75,000 cubic feet per hour, corresponding to 60 per cent. of the total make; the other 40 per cent. being used for heating the ovens. The whole of the oven doors are operated from one end of the battery by means of a hand-winch, working a travelling chain and lifting carriage.

The coke-bench, consisting of a steel girdered frame, covered with concrete and cast-iron plates, is carried on a series of cast-iron columns above the loading-lines. The bench is provided with specially-designed charging-holes, with covers to prevent the quenching water percolating through. Griping is done on the bench. Very little is, however, required; the Company's coking coal being of a high quality, with the result that the smalls are of a negligible quantity. This special arrangement of benches, it is claimed, reduces the labour costs of loading below those of any other existing type. The quenching water is delivered at the constant pressure of 100 lbs. This is secured by means of an accumulator with a 10-inch ram, which is served by two steam-driven pumps, one being a stand-by. When the desired pressure is attained, and no more water is required, the rising ram lifts a weight, and automatically stops the pump, which is again started when the falling ram releases the weight. The water is taken from a well which is fed by gravitation from the reservoir. Surplus water from the coke-bench drains off on to the settling

beds, and thence through a series of channels flows back to the reservoirs, which are of an extensive character.

The gas is drawn away from each oven by a separate ascension-pipe through isolation valves into the collecting main, which runs the full length of the battery. The gases are then passed through three annular air-coolers arranged in series; the gases passing up No. 1, down No. 2, and up and down No. 3, which is divided in the centre, and thence through a serpentine cooler. The latter consists of a series of horizontal pipes, over which a continual stream of water is passing, which water, draining into a well, is pumped to a cooling-tower above the serpentine, to be cooled before re-using. From here the gases pass through the tar-extractor—which is on the Pelouze principle, except that it has a horizontal rotating basket—and on through three ammonia scrubbers.

A small portion of gas is tapped off from the feed main to the ovens, and passed through a purifier for use in the laboratory. The gas which is returned to the ovens is heated by being passed through two of the annular coolers, and then through a governor to ensure it being kept at a constant pressure at the ovens. The warm gas passes along a common main above the ovens, over each of which is a separate valve to regulate the supply of gas to either end of the oven wall; the gas being accurately measured to each of the vertical flues by means of regulating-cocks on the front of the ovens. The air supply is also regulated from the front of the ovens. Reversal of the gas and air supply is effected by winches installed at the end of the battery.

With the exception of the pumps for supplying the accumulator at the coke-bench, the whole of the necessary auxiliary plant, including the exhausters, is installed in one building, which is two storeys high; the upper being used for laboratory and office, and the roof supporting the high-level storage tanks for water and liquor. Steam is raised in two gas-fired Lancashire boilers, each 30 ft. by 8 ft., with a working pressure of 100 lbs. The stack, which serves both the ovens and boilers, is 170 feet high.

Adjacent to the scrubbers is a large storage tank for the strong ammonia, and also a low-level tank, for collecting the tar and ammonia from the various parts of the plant, from which it is pumped to a decanting tank, where the water is drawn off to be used at the scrubbers, and the tar passed to the storage tank at the siding. The strong ammonia is pumped to the high-level tank feeding the sulphate plant. With the exception of the ammonia still (which is of special design) this is of the usual type, including solid-plate lead saturators, centrifugal dryer, &c.

As already stated the surplus gas amounts to 75,000 cubic feet per hour. At present this is being used to raise steam at the colliery boilers. It is the intention of the Company, however, to instal gas-engines as the prime-movers. The power-house has been designed with this view, and will be extended to accommodate gas-engines of 1500 kilowatt capacity, which will generate power for all purposes excepting winding at the Company's three groups of collieries—Apedale, Podmore Hall, and Chesterton. The first section consists of two two-crank non-compound vertical steam-engines of 130 kilowatt each, built by Bellis and Morcom, driving by direct coupling two three-phase alternating current sets of 130 kilowatts, at 375 revolutions a minute, 550 volts, 25 periods, supplied by the General Electric Company. The excitation and lighting current is generated by a 35 kilowatt motor generator, supplied by the General Electric Company, and one 20 kilowatt steam set direct coupled to a Browett engine, and supplied by the Phœnix Dynamo Company, Limited.

The members did not miss any one section of the plant, nor did they lose a single feature of the demonstration of the entire operations that was made for their edification. They scrambled up on to the platform at the side of the charging-box to watch the stamp busy at its compressing work, which it was doing from one end of the box to the other, with its pair of rams, with a mechanical seriousness and regularity that was almost ludicrous. It would not be far from the truth to say that the slack used for the coke-ovens was at one time a drug on the market; now a splendid coke is derived from it, as well as gas and other valuable products. After watching the preparation of a charge, the members mounted the coke-bench to see a wall of incandescent coke being pushed from one of the ovens, played upon by hose, and finally quenched and broken down into large pieces. Then back again to the charging machine they went; and, into the oven that had just lost its charge, they saw the wall of freshly compressed slack travelling in to fill the void. One thing that struck the visitors was that there was such a small number of men about though the operations are so large; and, on inquiry, they found, as a natural consequence, that labour costs are small. Other parts of the plant were inspected; and then the time had arrived for the return journey to be made to Longton.

Dinner by Invitation of the Mayor.

Shortly after Longton was reached, the visitors, the Gas and Electricity Committee, the gentlemen who had received the visitors at the Apedale Colliery, and others were the guests of the Mayor at the Town Hall. The dinner was excellently served, and was on a generous scale. His Worship was in the chair; and on his right hand side were the President and Mr. Charles Meiklejohn (whose services as late Hon. Secretary of the Midland Association were to receive tangible recognition on this occasion), and on his left the Rev. H. Rowe, Mayor's Chaplain. There must have been some 90 guests in the company.

After dinner, the Mayor again expressed his delight at having around him so many gentlemen interested professionally in industry; and then he submitted the loyal toast. Time pressed on account of the train service from Longton; and his Worship kept the toast-list going in a remarkably business-like style, but through it all enjoying thoroughly the evident pleasure of those about him. Mr. B. W. Smith, of Walsall, in suitable terms, proposed "The Town and Trade of Longton;" and response was made by Mr. J. W. Beswick. Then the Chairman proposed "The Midland Association of Gas Managers;" and above all other remarks this one met with the warmest approval of those present: "Your President has been a credit to our Council and to the Gas Committee." There was hearty cheering on the President rising to respond; and his first words were those of thanks for his flattering reception. Then followed expressions of thanks to the Mayor for his generosity, and to the Gas and Electricity Committee. No Gas Engineer or Manager (observed the President) had a better Committee than he had. Whatever he brought before them, they thoroughly thought over and sifted before adopting it; but he had nothing of which to complain. From, he added, the technical point of view, perhaps the greatest event of the day had been the visit to the Apedale Collieries, to see the new coke-ovens. They, as gas engineers, had seen something there to set them thinking, and probably they had found something there upon which they might improve. "Kindred Associations" was the next toast; and this was in the capable hands of Mr. Samuel Glover, in the unavoidable absence of Mr. Fletcher Stevenson. In the course of the speeches, much had been said about the smoke of Longton; and Mr. Glover expressed the hope that those present might live to see a scheme of heating potters' kilns by gaseous or other solid fuel, by which the work would be done better, and without polluting the atmosphere. He knew that the kilns of one of the highest class potters were to-day being heated with smokeless fuel, and was doing the work more reliably and cheaply than before. The President of the Manchester Institution (Mr. J. W. Morrison) and the President-Elect of the Eastern Counties Association (Mr. John Young) responded.

Presentation to Mr. Charles Meiklejohn.

An interesting incident, crowning seventeen years' service to the Association in the position of Hon. Secretary, occurred at this part of the proceedings.

The President said: Mr. Mayor and gentlemen, As representing the members of the Midland Association of Gas Managers, I have now to perform what to me is a most pleasant duty, and I feel it also to be an honour. I have on my right-hand side a gentleman who has served the Association for seventeen long years as Hon. Secretary, and who has done the work in a manner that has gained for him the esteem, and affection I may say, of every member of the Association. When my friend took the office, the members of the Association numbered something like 60; to-day, I believe we number something like 110 or 112. Mr. Meiklejohn has given a great deal of time to this work. He has sacrificed himself, and his time and money, for the interests of the Association. Let me add that, in doing this, he has been performing a service for the whole gas industry of the Midlands—whether private company or municipal undertakings. Mr. Meiklejohn has kept his character unblemished; he has also retained throughout his long tenure of office the respect and esteem of every individual member. Gentlemen, that is a great thing to say. For a man to occupy an office for over seventeen years, and to be universally held in the highest esteem and respect is a credit to him, and is certainly a great satisfaction in this instance particularly to the members of the Association. One of the pleasantest items of the programme to-day is this, that you members of the Association are giving some tangible form to your regard for Mr. Meiklejohn, for the services he has rendered. Mr. Meiklejohn, believe me, it is with the greatest pleasure that we hand to you to-day a small token of the regard and esteem in which you are held at the close of the long and faithful service rendered to the Association, and also of the interest you have taken not only in the Association as a whole, but in every individual member. I am pleased this presentation has fallen in my year of office. The most pleasant event in my presidency will be the handing to you of this token of our regard for your faithful services.

The gift took the form of a handsome silver tray, on which was inscribed—

> Presented to
> **Mr. Charles Meiklejohn**
> by the members of the
> Midland Association of Gas Managers
> In Recognition of His Valuable Services
> as Honorary Secretary.
> *May 20th*, 1909.

The tray weighs 175 oz.; and in design it is in keeping with that of the tea and coffee service presented to Mr. Meiklejohn at the time of his marriage.

Mr. Meiklejohn, in reply said: Mr. Mayor, Mr. President, and gentlemen, I scarcely know how to express my feelings on this momentous occasion. This is not the first time I have been indebted to the kindly feeling and goodwill of the members of the Midland Association of Gas Managers. I recollect the fact that

a few years ago, when I was about to get married, you united in giving me a present, and in wishing me happiness in embarking on that new departure in life. You have again, after seventeen years' service, marked, in the kindest possible manner, your sympathy and regard. You will understand, Mr. Mayor, that I have taken a wise step in retiring from office, lest the members might be tempted to find some other ground for making a united testimonial. It has been to me a work of love and extreme pleasure to assist in the objects of the Association during those seventeen years; and I would here like to acknowledge not only the kindness I have received from the members of the Association, and the yeomen service the members have done in advancing the interests of the Association, but the generous and broad-minded way in which the Directors of my Company have supported me in my work for the Association. It has not been a great demand on my time; but whenever it has happened that the meetings of my Directors have clashed with those of the Association, there has never been any question by my Directors as to altering their meetings to enable me to attend those of the Association. (Cheers.) Not only during the year that I was President of the Association, but at all times, my Directors have taken the deepest interest in the welfare of our organization; and, on one occasion, they invited you to Rugby when no one was in office in connection with our Company. Therefore I feel the greatest gratitude to my Directors for their interest. I hope what my Directors have done, and what the Longton Gas and Electricity Committee have done, will encourage other Boards and Gas Committees to do likewise. I express my deep thankfulness to you for your great kindness. I shall cherish this memento, not so much for its intrinsic value, as for what it represents in your thoughts, and the kindly feeling, sympathy, and goodwill towards me of which it is the evidence.

There were two other toasts—"The Longton Gas and Electricity Committee," proposed by Mr. J. Fergusson Bell, of Derby, and responded to by Mr. W. Hulse, the Vice-Chairman of the Committee, in the absence through ill-health of the Chairman (Mr. Alderman E. Brookfield); and "The Chairman," proposed by Mr. Charles Meiklejohn, and responded to by his Worship. The principal points of Mr. Meiklejohn's speech in this connection are given earlier, in this report of the day's proceedings, in sketching the career of the host of the day.

This ended one of the happiest "outings" of the Association.

Meeting of the Institution of Gas Engineers.

In the "JOURNAL" for the 16th of March, we gave a few particulars in regard to the annual meeting of the Institution of Gas Engineers, which will be held at the Institution of Mechanical Engineers, Storey's Gate, from the 15th to the 17th prox., under the presidency of Mr. Thomas Glover, the Engineer and Manager of the Norwich station of the British Gaslight Company, Limited. We learn from the Secretary (Mr. Walter T. Dunn) that the following communications will be submitted:—

"Carbonizing," by Mr. J. Ferguson Bell, of Derby.
"The Efficiency of a Gas in Relation to Incandescent Lighting," by Mr. Arthur M. Forshaw, M.Sc., of Birmingham.
"A Study in Working Costs," by Mr. Herbert Lees, of Hexham.
"Carbonization in Chamber Settings," by Dr. Rudolf Lessing.
"Report of the Gas-Heating Research Committee, and Explanatory Note," by the Chemist to the Committee, Mr. E. W. Smith, M.Sc., of Leeds.
"The Relative Capital Accounts of Gas Undertakings Owned by Companies and by Local Authorities," by Mr. Arthur Valon.
"Some Advantages and Disadvantages of a Hot-Coke Conveyor," by Mr. Robert Watson, of Doncaster.

On the evening of the opening day, the President and Mrs. Glover will give a reception at the galleries of the Royal Institute of Painters in Water Colours, Piccadilly; and on Friday, the 18th, there will be an excursion to Norwich, where the party will be invited to luncheon by the Directors of the British Gaslight Company—the arrangements for the afternoon being undertaken by members and officers of the Norwich Corporation.

Comparisons of Gas and Electric Light.—At the first annual meeting of the Indiana Gas Association, Mr. J. Earl King, the Superintendent of the retail department at the Chicago office of the Welsbach Company, read a paper on "High Candle Power Illuminants," in which he gave the following comparative figures in regard to the cost per hour of gas and electricity: Four-light gas-cluster, 299-candle power, 1·33c.; three-light gas-cluster, 240-candle power, 1c.; four-light tungsten lamp, 223-candle power, 2·4c. The prices were worked out on the basis of gas at $1 per 1000 cubic feet and electricity at 10c. per kilowatt.

The High-Pressure Gas-Lamps near Blackfriars Bridge.—Attention having been called to the fact that the two high-pressure gas-lamps had been removed from the rest on the northern approach to Blackfriars Bridge, it may be of interest to state that the lamps in question—which are the pioneer lamps of their kind for street lighting in the City of London, having been put up in 1901—are only temporarily away, on account of the works which are being carried out in connection with the public subway at the place named. The tunnelling operations necessitated the temporary removal of the rests; but, in a short time they will be restored, and with them the two four-burner gas-lamps that have for so long efficiently lighted the approach to the bridge.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Quarterly Meeting at Bamford.

THE One Hundred and Fifty-Sixth Quarterly Meeting of the Institution was held last Saturday at Bamford, in Derbyshire. It was a glorious May day; and no one seemed to regret that for once the business on the *agenda* was crowded into the smallest possible space of time. The meeting place for the day was the Marquis of Granby Hotel at Bamford, about 12 miles from Sheffield and 32 miles from Manchester. The programme included an inspection of the extensive reservoirs and dams that are being constructed in the Derwent Valley for supplying water to Sheffield, Derby, Nottingham, and Leicester. About a hundred members were present.

After luncheon—the President (Mr. J. W. Morrison, of Sheffield) occupying the chair—a short business meeting was held, and then the party were conveyed by rail up the Derwent Valley, and, under the guidance of Mr. Morrison and Mr. D. L. Serpel, the Assistant-Engineer to the Derwent Valley Water Board, they viewed the works now in progress there; most of the time being spent at Howden, where the top reservoir of the scheme will be situated. The *cicerones* had no light task in answering the numerous questions put to them at various points of the journey; and on the return to the Bamford terminus of the Board's private railway, a hearty vote of thanks was accorded Mr. Serpel, who, in responding, said it had afforded him much pleasure to conduct the party over the ground and give explanations on the different points raised.

THE BUSINESS MEETING.

The business meeting was held in the hotel—Mr. MORRISON presiding.

The HON. SECRETARY (Mr. W. Whatmough, of Heywood) read the minutes of the previous meeting; and they were approved without discussion.

Mr. E. A. HARMAN (Huddersfield) then submitted a paper on "Slot-Meter Consumption"—see p. 524. At the close of its reading,

The PRESIDENT suggested that, as the time at disposal was limited, discussion on the paper should be deferred to the next meeting.

This course having been agreed to,

The PRESIDENT moved a vote of thanks to Mr. Harman for his communication.

Mr. S. GLOVER (St. Helens), in seconding the proposition, expressed regret that the members were unable to discuss then the points raised in the paper, particularly as he understood Mr. Harman had come fully prepared for the fray. However, between now and the next meeting they would have time to consider the paper, and probably be in a better position to tackle what he (Mr. Glover) considered were the defects in Mr. Harman's system as to prepayment meters.

The motion having been carried,

Mr. HARMAN briefly acknowledged the compliment.

THANKS TO THE WATER BOARD.

Before the members separated after tea,

The PRESIDENT, referring to the visit they had paid to the works of the Derwent Valley Water Board, pointed out that they were much indebted to Alderman T. R. Gainsford, the Chairman of the Board, and to Mr. Sandeman, their Engineer. In proposing a vote of thanks to these gentlemen for permission accorded to the Institution for an inspection of the work in progress, he reminded the meeting that Mr. Robinson, who was associated with Mr. Sandeman, was well-known in the gas world by reason of his connection with Leicester.

Mr. S. GLOVER, in seconding the motion, said it had been a very instructive day for the members; and he paid a high compliment to the gentlemen who had acted as guides in the inspection of the works.

The vote having been heartily accorded, the business concluded; and the remainder of the evening, till train time, was spent in the grounds of the hotel.

The following is a description by Mr. Morrison of the

DERWENT VALLEY WATER-WORKS.

As the result of a prolonged parliamentary contest in 1899, the Derwent Valley Water Board was constituted, consisting of thirteen members—Sheffield and Derby each appointing three, Leicester four, Nottingham two, and the county of Derby one—with a standing Arbitrator.

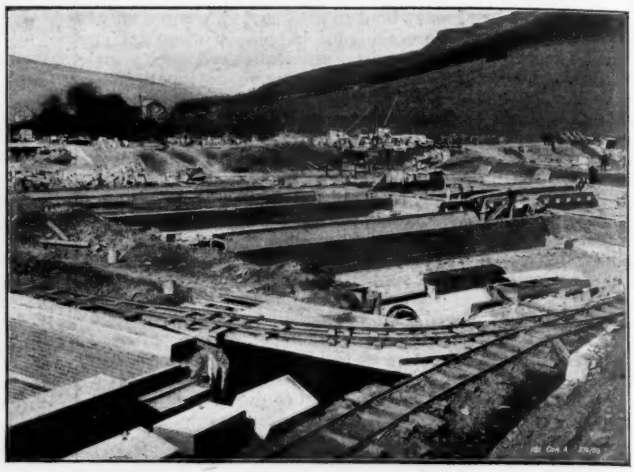
The works authorized are on a very extensive scale, and twenty years are allowed for their completion. There will be five reservoirs and a service reservoir, with about 100 miles of aqueduct and 20 acres of filter-beds. Two of the reservoirs will be above Derwent Hall, two in the Ashop Valley, and the fifth at the junction of the Ashop and Derwent, extending from Ashopton towards Bamford. This will be the lowest and largest of the reservoirs, and will be chiefly used for compensation purposes.

The total collectable yield of the watershed is about 50 million gallons per day, of which 33⅓ millions will be available for supply to the constituent authorities in the following proportions:—

	Gallons.
County of Derby	5,000,000
County of Nottingham, until the year 1930	1,000,000
Sheffield	6,800,000
Derby	6,800,000
Leicester	9,700,000
Nottingham	3,900,000

The existing and authorized water-works of the respective authorities provide for 36⅔ million gallons per day, which will be increased by 33⅓ million gallons from the Derwent watershed; bringing the total up to 70 million gallons per day.

The population deriving a supply of water from the Derwent and existing schemes in the year 1911 is estimated at 1,670,000; and it is further estimated that the number will be increased to 3,182,000 in the year 1958—the date at which it is assumed that a further supply will have to be obtained.



Construction of Roughing Filters, Bamford.

Pipe Laying Through Yarncliffe Wood, Section "A" Derwent Aqueduct.

The total cost of the scheme is estimated at upwards of £6,500,000; and it is to be borne by the four Corporations in the statutory proportion to which they are entitled to the water.

The expenditure on reservoirs and works to be borne jointly by the constituent authorities is estimated at £5,500,000; for utilizing the supply through a tunnel under Stanage Edge to Sheffield, £425,000; for the extension of a pipe-line to Sawley, for Leicester, £600,000; and for another to Derby from the reservoirs south of Ambergate, £120,000.

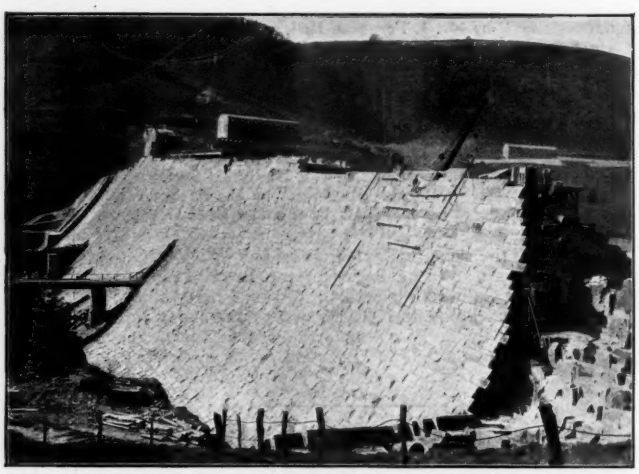
The cost of an extension of a pipe-line from the Ambergate reservoirs to Nottingham has not up to the present time been determined.

[We are indebted to Messrs. PAWSON AND BRAILSFORD, of Sheffield, for the use of the illustrations of the Derwent Valley Water Board's works.]

Each reservoir will be two miles in length; thus giving ten miles of lakes. Their capacity will be, roundly, 10,000 million gallons, and they will receive the rainfall from 31,694 acres. The following are the names, extent, and capacities of the reservoirs:—

Name.	Approximate Area. Acres.	Capacity. Gallons.	Feet Above Sea.
Howden	157	1,886,000,000	870
Derwent	168	2,000,000,000	776
Hagg Lee	178	2,160,000,000	806
Ashopton	141	1,472,000,000	675
Bamford	242	2,500,000,000	585

The works will be constructed in three instalments. The first, consisting of the Howden and Derwent reservoirs, will yield 13 million gallons daily for supply purposes; the second, which is the Hagg Lee reservoir, is estimated to yield 10⅓ million gallons per day; and the third (the Ashopton and Bamford reservoirs together) will provide a further quantity of 10 million gallons of water.



Derwent Dam.

Checking the Waste of Water.—According to "Engineering Record," a waste-water examination of more than ordinary interest has recently been conducted at East Orange (N. J.) by the Pitometer Company. Some time ago, Mr. A. A. Reimer, the Engineer of the Water Department, reported that the consumption and waste there were dangerously close to the maximum supply. By the adoption since then of the air-lift system for certain wells, the amount of the supply will be increased somewhat; but as all the water has to be pumped, it is desirable, for financial reasons, to keep the waste as low as practicable. Mr. Reimer advocated the immediate purchase of enough meters to place one on each service; and the report of the above-named Company indicates that this recommendation has an unusually strong basis in the widespread distribution of the waste. The night flow in the conduit which delivers water to the city is 64 per cent. of the daily average—a fact showing very clearly that a large amount of water is being wasted. By subdividing the city into four districts, and gauging the supply of each independently, it was learned that the waste was practically uniform throughout them; there being only a few blocks where indications showed that excessive waste was localized. These few places can be investigated easily by night inspection with an aquaphone; but it is another matter to check waste distributed uniformly over nearly 7000 services. The measurements taken by the Company indicate that the mains are in good condition, and that the average waste of 50 gallons per head must be sought in the defective plumbing on private premises. The character of the population is mainly residential; and it is questionable whether an attempt to restrict the waste by frequent house-to-house inspection would be regarded with favour by the people. Under such conditions, the metering of all services is considered as being particularly desirable.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Barry.

THE place selected for the May Meeting of the Institution was Barry; and there the members, to the number of about thirty, assembled last Wednesday. The fine weather with which the Institution were once more favoured, a discussion on a topic which is now uppermost in the minds of gas managers generally, and last, but not least, the hospitality and hearty welcome extended to them by the Chairman of the Urban District Council and the members of the Gas and Water Committee, and the attention shown to the visitors by the Engineer and Manager, Mr. T. E. Franklin—all contributed to make the meeting a very pleasant one. The District Council were represented by the Chairman (Mr. D. Lloyd) and Mr. Griffiths; the Chairman of the Gas and Water Committee (Mr. J. T. Hogg) being unfortunately detained in London in connection with the proceedings on the Glamorgan Water Board Bill, which business was also responsible for the regretted absence of the Hon. Secretary (Mr. Octavius Thomas), whose duties were performed by Mr. E. H. Swain, of Pontypridd. Barry is a growing place, and no doubt has a great future before it; and therefore the outlook for the gas undertaking (which enjoys a steadily progressive business) is a bright one. Building operations are at present being rapidly carried on; and a more flourishing condition of affairs generally exists now than for many years past. The make of gas, which last year was 158 million cubic feet, has been increasing for quite a long time at the rate of 10 million cubic feet per annum. When the Company sold the undertaking to the Council thirteen years ago, they were only making about 30 million cubic feet of gas per annum.

The Meeting.

The Council had kindly placed the Gas and Water Offices at Barry Dock at the disposal of the Institution; and the business meeting was held here, under the chairmanship of the PRESIDENT (Mr. Thomas Acland, of Llanelly).

MINUTES OF LAST MEETING—REPORT AND ACCOUNTS.

Mr. E. H. SWAIN (of Pontypridd), who acted as Hon. Secretary, said that Mr. Octavius Thomas had written regretting his inability to be present, as he was detained in London in connection with the proceedings on the Glamorgan Water Board Bill. Mr. Swain then read the minutes of the last meeting; and they were confirmed. Subsequently he read the accounts for the past year, which were also adopted. These showed receipts amounting to £25 14s. 6d. for the year, and a balance in the Treasurer's hands (with the sum of £15 2s. 3d. brought forward) of £22 7s. 10d. The fourth annual report of the Council was to the effect that during the year three members had joined the Institution, nine had resigned, and one had died—leaving a membership of 48 at the end of the year. The Council recorded with deep regret the death of Mr. Thornton Andrews, who took a keen interest in the Institution. They recommended a donation of £5 5s. from the funds of the Institution to the Livesey Memorial Fund. The report was adopted.

ELECTION OF OFFICE-BEARERS.

The following were the officers elected for the ensuing year :—

President.—Mr. A. H. Brookman, of Tenby.
Vice-President.—Mr. J. C. Pennington, of Colwyn Bay.
Hon. Treasurer.—Mr. Henry Morley, of Cardiff.
Hon. Secretary.—Mr. Octavius Thomas, of Pentre.
Members of Council.—Mr. H. D. Madden, of Cardiff; and Mr. A. W. Branson, of Caerphilly.
Hon. Auditors.—Mr. J. M. Small, of Merthyr Vale; and Mr. F. C. White, of Treharris.

NEW MEMBERS.

The following new members were then elected: Mr. Reginald G. Clarry, of Swansea (rejoined); Mr. James Robb, of Beaufort; Mr. Sydney Murray, of Pontycymmer; Mr. C. H. Carder, of Cardiff; Mr. L. G. Langford, of Abertillery; and Mr. W. Turk, of New Tredegar.

THE LIVESEY MEMORIAL FUND.

The PRESIDENT said he had now to ask the members to consider the question of subscribing to the Livesey Memorial Fund. He thought he was correct in stating that all the District Institutions of Gas Engineers in the country had already subscribed; and he had no doubt their Institution would follow this example, and agree to give a sum of £5 5s.

Mr. DAVID JONES (Dowlais) said he had much pleasure in proposing this; and Mr. G. MAYNE (Penrhiwceiber) seconded.

Mr. SWAIN said a letter had been received from Mr. W T. Dunn, the Secretary of the Institution of Gas Engineers, asking whether the question of subscribing to the fund would be considered at the next meeting, and giving a list of the Association subscriptions already received.

Alderman THOMAS CANNING (Newport) said he was pleased to support the mover and seconder of the resolution. He thought that the Institution could do no better than follow the example that had been set by so many other Associations all over the kingdom, and honour the memory of one whose name would remain as a very great honour to the gas profession throughout the whole of the British Islands. He was quite sure, too, that the good work done by Sir George Livesey in many respects and in varying fields would long remain, and would be productive of good effect for all who were engaged in the profession to which Sir George was decidedly an ornament and a great pillar of strength. They would be honouring the name of a great man, to whom several of those present who knew him for many years personally were really affectionately attached; and they would be doing something more besides. They would be assisting to enable the profession generally to establish a worthy and fitting memorial to Sir George by endowing a professorship for research into the more abstruse problems of their business.

The resolution was unanimously agreed to.

THE QUESTION OF AFFILIATION.

The next item on the *agenda* was to consider a notice of motion by Mr. Edward Jones, of Burslem, "That this Institution affiliate with the Institution of Gas Engineers."

Mr. SWAIN said he had received a letter from Mr. Jones, who apologized for not being able to attend the meeting, on account of pressure of work. He, however, sent on the rules of the Institution and a few remarks regarding the subject of affiliation. In the course of the latter, it was pointed out by Mr. Jones that members of an affiliated body who were qualified to become members, associate members, or associates of the Institution would be eligible for election without entrance fee during a period of twelve months after affiliation. The terms of affiliation were set forth in the "Transactions" of the Institution for the year 1904, where there appeared a report of the special meeting, when the five English Associations and one Irish Association became affiliated, and arrangements were made for the affiliation of others which it was hoped would come about in due course. There were now seven District Associations affiliated with the Institution; and the Wales and Monmouthshire Institution was the only one left outside. While they were only a young Institution (which was primarily the cause of their not falling into line earlier), there appeared to be every reason why they should not defer the matter longer, but affiliate, and thus complete the organization of the Institution of Gas Engineers. There was a great deal to recommend it; and in the interests of the profession and of the industry, they should all be thoroughly united. The Institution Council was doing good work; and there was no reason why they should not participate in its government and benefits. In conclusion, Mr. Jones said that he had the utmost confidence in urging that the Wales Institution should complete the scheme of amalgamation by affiliation with the Institution of Gas Engineers.

The PRESIDENT remarked that they had heard what Mr. Jones had to say; and he would be glad if someone would propose that they affiliate with the parent Institution. They would have nothing to lose but everything to gain, both individually and collectively, by affiliation.

Mr. A. H. BROOKMAN (Tenby), in moving that they become affiliated, said it was quite unnecessary for him to recapitulate the arguments that Mr. Jones had so ably set forth in his letter; but there was one thing he would like to mention (to young members especially), and that was the simple fact that by affiliating they would be able to become members of the parent Institution without the payment of an entrance fee. This was a very great advantage. The question of the non-payment of a fee would affect about thirty members of this Institution; so that the £5 5s. they had to pay for affiliation was a small sum. Of course, this was an annual fee; but they would always have members going in, and the usual charge was a guinea a member, so that they would save a considerable sum in this respect.

Mr. MAYNE: Does this cover both fees? I take it a member pays his subscription?

Mr. SWAIN: If this meeting decides to affiliate, any member who desires to enter the Institution of Gas Engineers can do so within twelve months without the entrance fee of one guinea. He will have his annual subscription to pay, of course.

Mr. H. D. MADDEN (Cardiff), in seconding the motion, said it was a right move. They would not only strengthen themselves as a District Association, but also strengthen in a way the parent Institution, by this combination; and more especially was the step desirable if they were the only Association outstanding. They should fall into one long line with the parent Institution.

The proposal to affiliate was then heartily agreed to.

APPOINTMENT OF A REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

The PRESIDENT proposed, Mr. J. C. PENNINGTON (Colwyn Bay) seconded, and Mr. BROOKMAN supported, a motion that Alderman Canning be elected to represent the Wales Institution on the Council of the Institution of Gas Engineers; and this was carried with applause.

Alderman CANNING said he thanked the members very much

indeed—not for the office conferred, but for the honour done him. He added that the appointment extended only over one year; and then he had no doubt another Past-President, or some other member, would take up the work. He had some reluctance in taking any more burdens upon himself; but he found it was the unanimous desire of the Council that he should act, and he felt it was his duty to comply with this wish. He would do his best to represent the Wales Institution; but he was quite sure there were others who could do so better.

The Death of Mr. Thornton Andrews.

The President said that the Council had already sent to Mr. George Andrews a letter of sympathy with himself and other members of the family on the death of their father, Mr. Thornton Andrews; and Mr. Andrews had replied thanking them. He (the President) wished now to propose that the members should pass a vote of condolence with Mr. George Andrews and the family on the death of Mr. Thornton Andrews. He was sure everyone would agree with him that they lost a good and faithful representative of the gas profession when Mr. Thornton Andrews died. He was, he believed, the oldest Gas Manager in Wales; and at the time of his death he had been in the service of the Swansea Gas Company for more than fifty years. Speaking from his own knowledge of him, he was always willing to do everything he could to assist others in the profession in any possible way. He would ask Mr. Swain to read the letter received from Mr. George Andrews.

Mr. Swain said it was addressed to Mr. Octavius Thomas, and dated April 19: "I am in receipt of your letter of the 15th inst. conveying to me the resolution of sympathy with myself and other members of the family on the death of my father. Please convey to the members of the Council our best thanks for the kind resolution, which I will hand to my brothers and sisters.—Yours faithfully, George Andrews."

Alderman Canning said that having been for so many years connected with the late Mr. Thornton Andrews, and knowing him as well as he did, and feeling so much his death, he would like to say how he personally regretted the sad event. He agreed with what the President had said—namely, that they lost by the death of Mr. Thornton Andrews an esteemed and very distinguished member of their profession—one who for a long time carried on the Swansea Gas-Works with the greatest credit to himself, and with profit to those who had the good fortune to employ him. In addition to this, his thoroughness and straightforwardness of character, and the determination with which he maintained what he believed to be the rights of his Company against all comers, entitled him to the admiration and regard of his colleagues in the profession. Many of the members would remember how cordially Mr. Thornton Andrews welcomed the Institution to Swansea, and how from the beginning he stretched out the hand of friendship to the new organization. He had therefore the very great satisfaction of seconding that this vote of condolence (which was only a confirmation of what the Council had already done) should be sent to Mr. George Andrews and to the other members of his family under these distressing circumstances.

The resolution was carried, by the uprising of the members in a body.

The Proposed Calorific Power Standard.

A discussion was then opened by the President on the "Proposed Calorific Power Standard," and was joined in by several of the members. A report of this will be found on next page.

Some Points of Gas-Works Economy.

It was arranged in the programme that there should also be a discussion opened by Mr. J. H. Canning, of Newport, on "Some Points of Gas-Works Economy;" but owing to the time for adjournment having arrived, it was agreed, with Mr. Canning's consent, to defer this discussion until the September meeting, when it would be placed first on the *agenda*.

Place of Next Meeting.

Mr. Brookman said that, as the President-Elect, he was going to ask the Institution to hold their September meeting in Tenby. Perhaps it was asking the members to take rather a long journey from home; but still they had to consider that the Institution was composed of members who lived from one end of the Principality of Wales to the other, and it was therefore only fair they should hold their meetings in the different counties. It was an awkward place to get to; but the trains would allow them to spend four or five hours there. Both his Directors and he would be very pleased to welcome the members if they would visit the town.

The President proposed that the next meeting be held at Tenby, and thanked Mr. Brookman for extending the invitation.

Mr. J. M. Small (Merthyr Vale) seconded the motion; and it was carried unanimously.

Votes of Thanks.

The President proposed a hearty vote of thanks to the Chairman and Committee of the Barry gas and water undertaking for the use of the room in which they were holding the meeting. It was, he said, always gratifying to find Committees or Boards of Directors taking a lively interest in Institution meetings, and rendering what assistance they could in the way of lending rooms, &c. He asked Councillor Griffiths, who was present, to convey the vote to the Chairman and members.

The vote having been accorded,

Councillor Griffiths said it would be a pleasure to comply with the President's request. Speaking personally, he felt, after being privileged to be present among the members that morning, that the very least any body of men—whether connected with a public undertaking or a private company—who had a suitable room available could do was to place it at the disposal of an Institution of this sort.

Alderman Canning proposed a vote of thanks to the President for the manner in which he had conducted what had been a successful meeting. They had come to certain important resolves. The determination to affiliate, for example, was a good progressive resolution.

Mr. Madden seconded the vote of thanks to the President, not only for his occupation of the chair, but for the manner in which he had fulfilled the other tasks imposed upon him. He believed Mr. Acland had not been in the best of health, and had come there that day at some trouble to himself. They trusted he would be better than he had been during the past two or three months.

The vote having been cordially passed,

The President thanked the members, and said it was a pleasure to him to do what he could to further the aims of the Institution. He had even, for the purpose of attending a Council meeting, cut short by a week the leave of absence which had been granted him on considerations of health.

The Luncheon.

The members then proceeded to Culley's Hotel, Barry Dock, where they were entertained at luncheon by the Chairman of the Urban District Council (Mr. D. Lloyd) and the Chairman (Mr. J. T. Hogg) and members of the Gas and Water Committee. Mr. Lloyd was in the chair, and was supported by Mr. Griffiths and other members of the District Council; but unfortunately Mr. Hogg was detained in London on the business of the Glamorgan Water Board Bill.

After lunch, a short toast list was gone through. Mr. Lloyd having proposed "The King," Mr. Griffiths submitted "Success to the Wales and Monmouthshire District Institution of Gas Engineers and Managers." He said that, from being present at the meeting that morning, he had seen that the chief object aimed at by the Institution was the imparting of knowledge one to another; and this was an object that should be fostered. He had been struck by the unanimity with which the members had voted a sum of money to the Livesey Memorial Fund. With a knowledge of the gas industry extending over only two years, he had gleaned that Sir George was regarded by the gas managers of this country as being at the head of the profession; and it had pleased him to see the donation so heartily agreed to. He coupled with the toast the names of the President and Alderman Canning; and these gentlemen, in responding, made due acknowledgment of the hospitality displayed towards the Institution by their hosts, and expressed the wish that the gas and water undertakings of the town might prosper. The President proposed "The Chairman and Members of the Council of Barry;" and Mr. Lloyd, in reply, said he hoped the business meeting had been profitable, and that the visit to the gas-works would be interesting. He hoped this would not be the last time that they would see the Institution in Barry.

Visit to the Gas-Works.

After lunch, the members proceeded to the gas-works, over which they were shown by Mr. T. E. Franklin (the Engineer and Manager) and Mr. R. L. Aspinall (his Assistant). The works are at present unequal to the demand that is put upon them; the output in view at the time they were built having been nothing approaching the 158 million cubic feet which were sent out last year. Therefore Mr. Franklin, who has only been at Barry a little over twelve months, has drawn up a scheme of proposed extensions, alterations, and renewals, which has been submitted to the Council. An instalment of the work has been already agreed to; and a loan is to be applied for, in order to provide, forthwith, two new boilers, a sulphate plant, a new exhauster, &c. This will doubtless be followed in due course by an extension of the gas making plant, and other matters. Perhaps a water-gas apparatus, instead of further coal-gas plant, may be decided upon. But as to this, no determination has yet been come to. The provision of the sulphate plant, Mr. Franklin estimates, should result in a net increase in profit of from £400 to £500 a year—the ammoniacal liquor being at the present time disposed of by contract to an outside firm. The cost of the scheme he recommends (without including the extensions of the gas-making apparatus), he puts at from £7000 to £8000. Unfortunately, Barry has already a heavy capital account; and Mr. Franklin, in his report, says that this position of affairs is due to the fact that whatever profit has been made in the Gas Department for the last thirteen years has been handed over in aid of the Water Department, which has always been worked at a heavy loss—a total sum of £29,700 having been thus expended. Consequently, no suitable provision has been made for a reserve fund, and the gas-works generally have been "starved." By way of illustration, he refers to the fact that the selling price of gas at Widnes is less per 1000 cubic feet than the Barry capital charges (nearly 1s. 4d. per 1000 feet of gas sold) alone amount to.

To come to the gas-works themselves, there are at present two

retort-houses—one for inclined, and the other for horizontal retorts. The horizontal beds are, however, worn out; and the question now to be decided is what should be substituted for them. All the gas is being made in the inclined retort-house in a general way; but if any of these retorts have to be shut off, the horizontals have to be requisitioned, and a sum of £400 more was spent in labour last year owing to this having to be done. All the inclined retorts had to be repaired at one time; and the whole of the make during that period had to come from the old horizontals. The inclined retorts consist of eight beds of sixes; and six-hour charges are employed. The coals used are Mairos and Raglan from South Wales, with just a little Broughton and Plas Power from North Wales. Of course, it would pay to use other coals, were it not for the heavy carriage involved, which would, practically speaking, add again the pit price of the coal to the eventual cost.

No enrichment is now employed. Cannel was formerly used; but Mr. Franklin has given it up since he started retort-house governors, by which means the quality is kept so regular that no cannel is needed. Here, as in other places, the retort-house governor is a great success. Now no complaints are received about the gas; whereas there used to be many. The illuminating power is fixed at 15 candles; but there are no other restrictions at Barry, so that all the purification is carried out by oxide. The present price of gas is 3s. net per 1000 cubic feet for all purposes; the charge having been reduced 10 per cent. last year.

In a corner of the retort-house stands a tar-tower, "home made," but, of course, on the Dillamore principle. This has only been in use some six months; but great things are expected of it. Since these changes Mr. Franklin has experienced a substantial increase in the make of gas per ton. It was noticed during the inspection that as the coke comes from the retorts it falls on to a plate conveyor, and is immediately quenched by water-sprays. It is then taken by another plate conveyor and thrown into any part of the yard, or into storage hoppers under which there is an automatic weighing-machine to weigh hundredweights into bags. Here it may be parenthetically remarked that there is a good sale for coke in the town; it being seldom found necessary to send any away. At present, the water thus used in front of the retorts for quenching the coke is found rather expensive, as it is allowed to run to waste; about £4 a week being spent thus in water, which is charged by the Water Department at 9d. per 1000 gallons. One of Mr. Franklin's projected improvements is to fix an overhead water storage tank to which the water that has been used can be raised, and so be utilized over and over again. It will be pumped up from a settling-tank in the cellar of the house (which is already constructed), in which the water will first collect and deposit the particles of coke mechanically carried over. There are two holders on the works—one, of 600,000 cubic feet capacity, on the Gadd and Mason principle; while the other is an ordinary two-lift holder, of about 300,000 cubic feet capacity. How extensive is Mr. Franklin's scheme of improvements will be understood when it is mentioned that it includes a sulphate plant and house, a tar and liquor pump, boilers and boiler-house, a water-softening plant, an exhauster, an exhaust steam heater-condenser, a station-meter, an overhead water-storage tank, a circulating pump, an overhead liquor-storage tank, overhauling and repair of existing washing and scrubbing apparatus, a duplicate coal elevator, conveyor, and engine, a coal testing plant, repairs to the Gadd and Mason holder, alterations to stores and fitting shop, new mess-rooms, further carbonizing plant, and some miscellaneous items. He has, therefore, a busy prospect before him.

After the inspection of the gas-works, some of the members visited the Barry Docks and Island.

Visit of the Junior Institution of Engineers to Rugby.

In connection with the visits for the present session of the Junior Institution of Engineers, an excursion was recently made to Rugby, where, through the courtesy of the respective Directors, the works of the British Thomson-Houston Company and the Rugby Gas Company were inspected. At the former, the members, on being shown through the shops, had pointed out to them the special features of interest in the machining of the parts and general construction of the Curtis turbines, a number of which, of both the vertical and horizontal types, were in hand, with alternators of capacities ranging from 300 to 3000 kilowatts. The thanks of the Institution for the interesting visit having been conveyed by the Chairman (Mr. F. R. Durham), the members proceeded to the gas-works. On their arrival, the Engineer (Mr. Charles Meiklejohn) first gave a succinct description of the different sections of the plant and of their mode of operation, and afterwards conducted the party round, and explained in detail the characteristics of each section. By the invitation of the Directors of the Company, the members were subsequently entertained at luncheon at the Royal George Hotel—the Chairman (Mr. A. J. Lawrence) presiding. He expressed the pleasure the Directors felt in meeting them, and wished the Institution continued success in its work. Mr. Durham responded, and referred in appreciative terms to all that had been done to render the visit so interesting and enjoyable. The historic Rugby School was open for visiting in the afternoon, under special arrangements made with the assistance of Mr. H. R. Sanders, a member of the Institution, at whose invitation the members afterwards took tea before returning to London.

THE PROPOSED CALORIFIC POWER STANDARD.

[A Discussion at the Meeting of the Wales and Monmouthshire Institution, May 19.]

The PRESIDENT (Mr. Thomas Acland, of Llanelly) opened a discussion on this subject by reading the following notes.

At the annual meeting of our Institution held at Llanelly, on Sept. 30 last, when I had the honour and the pleasure of delivering my Presidential Address to you, I confined it to purely technical matters, and, as I thought, more especially to those practical questions of utility to gas engineers and managers of works of moderate dimensions, such as exist generally in Wales and Monmouthshire. At that time, nothing of any serious character had occurred to disturb or in any way to upset the ordinary methods which had been in practice almost from time immemorial, of testing gas for its illuminating value or otherwise. But since then (indeed, so recently as the last two weeks) a very important—nay, a most drastic—innovation or change upon the old practice has been made. And as that change or innovation has come about with the sanction of Parliament, it behoves us, as practical business men of affairs, to seize upon the earliest opportunity of educating ourselves upon this question. To-day, therefore, I propose to devote a few moments to questions more or less of a legal character—not with the intention of laying down the law, but simply to launch a discussion, which I hope will be of benefit to us all.

You are, of course, all aware that the Gaslight and Coke Company, who have been expanding at such a rapid rate during recent years, found themselves so restricted that, having reached their limits of supply, they were compelled, in order to carry on that expansion which they deemed desirable in their own interests, and in the interests of the immediate public, to go to Parliament with a view of acquiring the West Ham Company. With the merits or demerits of the scheme of absorption we have nothing to do to-day, and I do not propose making any comment whatsoever upon it; and, but for the matter of vital importance to which I intend referring presently, I would not have introduced into this discussion the names of these two Companies. The Gaslight and Coke Company and the West Ham Company, having presumably come to terms satisfactory to both parties, found it necessary to obtain parliamentary sanction for the carrying into effect of the terms; and they accordingly promoted a Bill. Thereupon the London County Council intervened, with the result that, for the first time in the history of gas making in this country, Parliament, at the intervention of the public, or at any rate of a public authority, have imposed another test in addition to that which had been imposed by the Acts of 1847 and 1871 for ascertaining the illuminating power of gas; this additional test being for the purpose of fixing a standard for testing the calorific or heating power of gas.

I need hardly point out how important and far-reaching in its consequences this new test is likely to be, because, in addition to this being the first time that Parliament has compulsorily imposed such a test upon a gas undertaking, there can be no doubt whatever that it has been done in consequence of the rapid strides which have been made by gas for heating purposes generally throughout the country. At the time when the Act of 1847 was passed, and even so recently as 1871, when the amending Act became law, no such thing as a gas-engine, a gas-cooker, or an incandescent mantle for the production of light was known. It is obvious, therefore, that the successful strides made in this direction by gas must have been enormous to call in the first place for the intervention of the largest and most important civic body in the world on the one hand, and for the recognition by Parliament of the justice of such a demand on the other. Of course, the only reason which the London County Council could advance in favour of getting such a clause inserted in the Amalgamation Scheme was the safeguarding of the public interest; and it was equally obvious that it was only for this reason that Parliament gave its sanction. It is not necessary for me to remind you that, of all the gas manufactured in this country at the present time, the bulk is used for heating, as against to-day the lesser quantity for lighting pure and simple. When the Act of 1847, and also the amending Act of 1871, were passed, the only intention of the promoters and of Parliament was that these Acts should control gas as an illuminant.

Perhaps it would be convenient at this stage if I were to give you the words of the section which has been inserted in the new Amalgamation Act of the Gaslight and Coke Company:—

> As from the 1st day of January, 1910, the standard calorific power of the gas supplied by the Gaslight Company within the Administrative County of London shall be 125 calories net per cubic foot [the expression "calories" being hereafter used in this section as meaning calories net per cubic foot]; but the Gaslight Company shall not incur any liability in the event of their supplying gas of a calorific power of not less than 112½ calories. Provided that if within one month after the expiration of a period of three years from the said 1st day of January, 1910, or after the expiration of any subsequent period of three years, either the Gaslight Company or the controlling authority shall desire that such standard calorific power shall be reduced or increased, and shall give to the other party and to the Board of Trade notice in writing of such desire, it shall be lawful for the Board of Trade, after hearing the parties and considering any representations made to them by either of the said parties, by order to reduce or increase the amount of the said standard calorific power, and of the deficiency below such standard

within which the Gaslight Company are not to be liable to forfeiture on either of such amounts, to such extent as to the said Board may seem fit, and the said Board may by such order make all such modifications of this section as may be necessary in consequence of any such reduction or increase as aforesaid, and may also direct the manner in which the costs, charges, and expenses of the said parties, and of the said Board of, and incidental to, any such application, and any inquiry held by, or under the direction of, the said Board in connection therewith shall be borne. The standard calorific power prescribed by the said Order, if made by the Board of Trade, shall, for the purposes of this section, be deemed to be the standard calorific power prescribed by this Act.

As from the said 1st day of January, 1910, sub-sections (2) (3) and (5) of section 5 (as to testing for calorific power, sulphur impurities, and illuminating power with flat-flame burners) of the Act of 1905 shall cease to apply, or have effect so far only as such sub-sections relate to the calorific power of the gas supplied by the Gaslight Company within the county. One testing for calorific power shall be made at each testing-place daily; but in the event of the calorific power being on any testing ascertained to be below 112½ calories, the gas examiner shall forthwith give notice thereof to the Gaslight Company, and a second testing shall be made at an interval of not less than one hour from the time of making the first testing at that testing-place, and the average of the two testings shall be deemed to be the calorific power of the gas at that testing-place on that day.

If on any one day the gas supplied by the Gaslight Company at any testing-place is of less calorific power to an extent not exceeding 6 calories than 112½ calories, the average of the testings for calorific power made at such testing-place on that day, and on the preceding day, and on the following day, shall, for the purposes of sub-section (8) of this section, be deemed to represent the calorific power of the gas on such one day at such testing-place.

The Gaslight Company shall not be liable to any forfeiture for defective calorific power where the calorific power on any day of the gas supplied by them is not less than 112½ calories; but where the calorific power on any day of such gas is less than such last-mentioned quantity the Gaslight Company shall be liable to the following forfeitures in respect of such deficiency—that is to say, where the deficiency does not exceed 3 calories, £5; where the deficiency exceeds 3 calories but does not amount to 6 calories, a sum not exceeding £10; for each complete 6 calories of defective power, a sum not less than £25 and not exceeding £100.

Provided always that the controlling authority of any testing-place, having recovered one forfeiture in respect of defective calorific power in the gas supplied by the Gaslight Company at one testing-place, on any day, shall not be entitled to any further forfeiture in respect of defective calorific power in the gas supplied by the Gaslight Company at any other testing-place, of such controlling authority on the same day. Provided also that no forfeiture shall be incurred in any case with respect to which it is certified by the Chief Gas Examiner that the defect of calorific power was occasioned by an unavoidable cause or accident.

This section was more or less altered when finally adjusted by the Select Committee of the House of Commons in the following way:—

The Company agreed to the imposition of a test of calorific value reluctantly. They objected to the introduction of any test for calorific value on the ground that such a new departure was one that should be effected by a General Act—say, by the amendment of the Gas-Works Clauses Act, rather than by dealing with an individual company. They objected further to the standard fixed—namely, 125 calories per cubic foot—on the ground that such value could not be obtained with any degree of certainty from 14-candle gas. They only accepted the standard on the condition that there should be a margin of 10 per cent. below the 125 calories before any penalties were imposed, and on the understanding that it was not to be expected of them that the standard would be regularly maintained.

A good many questions naturally occur to one when reflecting upon this tremendous innovation imposed by Parliament upon this important gas undertaking in London—the most important and extensive in the world. Is it likely that this test will by gradual steps become so extensively adopted or imposed by Parliament as to make it desirable for Parliament, in the interests of the public and of gas makers, to make it obligatory by Statute? And, if so, what effect is such statutory obligation likely to have upon gas companies? It is no use denying that gas as an illuminant to-day, although still in every way superior to electric light—having held its own successfully notwithstanding all the stupendous efforts which have been made to dislodge it from its primary position—is likely to maintain that premier position. It is of no use denying that the bulk of gas sold to-day is used for heating, and not for illuminating purposes. But, in saying this, I need hardly tell you that I do not in the least derogate gas from its premier position in the illuminating world. It simply means that a new, and until recently an unthought of, use has been found for gas, which has caused not only a revolution in the gas industry, but also the demand for more gas to increase by leaps and bounds. I need hardly point out to you that, on a careful consideration of this new departure, it will be found that, although this is the first time direct parliamentary sanction has been given to the calorific test, yet during the past few years, having regard to the gradual and steady growth of gas consumption for heating purposes, the undoubted tendency of Parliament has been to recognize that a time was coming when not only should every encouragement be given to gas companies to sell gas for heating purposes, but that a period would inevitably arrive when a drastic step in this direction would have to be taken.

The Gaslight and Coke Company have obtained from Parliament sanction to reduce the illuminating power of their gas from standards which had been fixed at 16 candles, to 14 candles, which has had universal recognition as the most suitable standard. Taking the growing practice of the last few years into consideration with this last parliamentary enactment, and looking forward to the future with the eye of experience—there is only one way of judging the future, and that is by the past—I respectfully venture to say that there is every probability of a time approaching in the near future when Parliament will altogether do away with the illuminating test, and will make it a statutory obligation on the part of all gas companies to adopt the calorific test in the same way as the Gaslight and Coke Company have now, for the first time, been compelled to do. Until such a time, be it soon or be it late, gas companies will go on experimenting with the calorific test side by side with the illuminating test; and after running in double harness, and taking advantage of every new discovery, it will come to a question of the survival of the fittest, when every probability points to the illuminating test dying a natural death in the not very distant future.

The PRESIDENT, supplementing the remarks which he had written out, said he had seen the views on the subject of some of the leading gas managers in the country; and from what he could gather, there was a pretty general consensus of opinion in favour of a calorific test for the heating and fuel value of gas. Whether the provision would become at one time general throughout the country, or whether it would filter down through the Provinces as the different undertakings went to Parliament for further powers, he did not know; but he thought it was very likely that before long they must expect an amending Act to the Gas-Works Clauses Act, dropping the out-of-date legislation and incorporating in the new Act all the modern ideas. There were many things now in the Gas-Works Clauses Act which were antiquated and did not meet present-day requirements at all; and if Parliament in its wisdom passed an amending Act, undoubtedly one of the clauses in it would be to make a calorific power test obligatory on all gas undertakings. This, however, was a matter on which he would not take up their time. The point he thought they ought to consider was, "Is a calorific test desirable? Do you want it? Is it likely to come?" If it was likely to come, the only record they had at present was the clause inserted in the Gaslight and Coke Company's Bill, where the power was fixed at 125 calories, with a reduction of 10 per cent. before penalties could be imposed upon the Company. He did not know whether they might regard this in the light of an experiment only—whether the authorities would wait and see how the new Act would work in practice after Jan. 1 next; but the London County Council at their meeting were very pleased that the clause was inserted in the Bill, and there was no doubt they would watch with interest the operation of it. A wise provision, to his mind, was that after the expiration of three years the Board of Trade might be asked to re-adjust, if found necessary, the arrangement with regard to the fixing of the number of calories. Experimental or not, they might depend upon it that Parliament, once having recognized and accepted the principle of the calorific value test, would not go back upon their work. They would extend it to other undertakings as additional powers were asked for, and so it would come gradually into use. Perhaps it would come more quickly than they believed. But he did not think they wanted two sets of tests. If the calorific test were imposed on all undertakings, they might drop the illuminating power test, and be satisfied with the other. He was not an authority on calorific value. He was in the position of wanting to learn something; and therefore he hoped the members would fully discuss the question.

Mr. A. H. BROOKMAN (Tenby) remarked that before the discussion was opened he would like to say he did not suppose they would have heard anything about the calorific power test had it not been for the attempt to introduce water gas so largely with ordinary gas, and to lower the illuminating power to 14 candles. Gas managers knew that their gas-stoves were as good a calorific test as anyone could have. With gas-fires especially, when the gas was reduced to about 14 candles, the users would very soon tell them what their candle power was. Directly one attempted to introduce a new system into an industry—monopolies such as gas or electricity—it stood to reason that a new test must be applied. It seemed to him the only question was the standard for this test, and the means for testing. Probably Mr. Madden would give them some information as to the different instruments used. He understood there were several, but that some were very much open to error, and the error was large—extending from about 10 to 15 per cent. Therefore they required very careful handling to get proper results. He thought that they would all—and especially those who were taking up the introduction of water gas—have to recognize a heat standard. The only question for the Institution was to arrive at this particular standard.

Alderman THOMAS CANNING (Newport) said he only wanted to offer a word or two as to the general policy of imposing this test. For a long time past it had struck him as being very extraordinary that the London County Council and other county and borough councils who were on the look out for something to test, had settled generally upon the purveyors of gas—whether company or municipal undertakings. He wanted to know why. Who had served the public better than gas undertakings? With regard to this calorific value that was to be looked for in illuminating gas, suppose to-morrow a company like (say) the Mond Gas Company was to start as a rival—as a competitor with the gas undertaking within the bounds of any municipality, or anywhere else they could get a footing—because stranger things had taken place. It was all very well to talk of monopolies and guarantees, and the

rest, under a Gas Act; but he had always found that, in the case of electric lighting, this supposed charter went to the winds at once, directly it was a question of offering something that could really stand up in competition with gas. Well, suppose Mond or a similar gas came along, would there be any test imposed upon it? He ventured to say, "No." The probability was that a company like that would be supplying gas varying from 20 to 25 calories—that was, one-fifth of the maximum of the standard imposed upon the ordinary gas undertaking; and there would be nothing to prevent the company going about and representing their product as being of as many calories as they liked, because nobody would trouble so long as they competed with the gas undertaking established in the district. That would be quite sufficient for the public; and what was sufficient for the public, would be sufficient for those who represented them, or misrepresented them, on the councils. That had been the experience up to now. He could tell them that he had seen electricity developed in opposition to a gas undertaking; and while the authorities took care to impose every restriction that they could think of, fair and unfair, upon the gas undertaking, they never imposed a single one at all upon the electric light concern. He did not argue that they should test electricity as they did gas. They could not test the electric current, for example, because there was no possibility of varying so far as the current was concerned in at all the same way as a current of gas would vary. But there was something that did vary. Voltage might vary, the conditions under which it was consumed might vary, or the filaments might vary; but there was nothing to prevent the purveyor of electric lighting to-day from selling his light on any basis he liked, or on no basis at all. He could say it was 50 candles, or he might say it was 500, if his conscience would stretch so far. The electrician could take the standard of illuminating power prescribed for a gas company, and could say that if the gas was consumed in a bunsen burner with an incandescent mantle, as a certain number of cubic feet were being used, giving a heat of so much, there could only be secured a certain light from the mantle. The electrician knew all about the gas man's standard; but the gas man knew nothing about the electrician's. It was made in Germany, or "made in the moon," for they had not got the slightest inkling yet as to what the real illuminating power of an electric lamp was. Well, now, electricity undertakings throughout the country were in competition with the gas industry—or, at least, they said they were—in regard to heating. They would like to be; but they could not. Very obvious reasons would prevent them from really coming into competition with gas in this direction. The gas people had an article with a first-class calorific power; and the electricians had not. But assuming that this calorific test idea went on, he wanted to know again, if the competition was to be entered into between gas concerns and the purveyors of furnace gases and the purveyors of electric current for heating, was it not only fair that this standard should be universal and applied all round? It would very soon be seen what the superiority was in respect of the commodity which their own industry supplied. Another point he would like to touch upon was that the standard of illuminating power was fixed back nearly in the middle of the last century. A terrific mistake was made by gas engineers at that time. No doubt the science of chemistry was not then so advanced as was the case to-day—or at least, a knowledge of chemistry was not so general among men who lived then as it was now. The consequence was that a man who was not capable of giving advice on the subject got the ear of Parliament entirely. He meant Mr. Samuel Hughes, whose name had been connected with one or two treatises. The outcome was that Parliament had for some years the splendid idea that the proper burner to test gas with was not a burner that would develop the power which the gas had in it for giving illumination, which was the only reason for its existence. Mr. Hughes's suggestion was that they should test gas with the very worst burner in the market—that was, one which could not show its qualities—and Parliament, in its ignorance, took his advice. To that they owed the fact that there was much trouble in regard to illuminating power. The moral of this story was that, whatever standard was imposed now—he did not care what it might be—must be arrived at after due deliberation. Now, 125 calories was equivalent to about 500 B.Th.U.; and he did not know that they should at any time consent, at any rate they should not willingly consent, without thorough investigation, that this should be the minimum—because a standard represented a minimum after all. Therefore—and he was speaking now only upon the question of policy—whatever the standard might be, if it was to be made general, it must be first very carefully considered. They must also know what it was that was to be prescribed as the standard calorimeter for testing this efficiency, so as not to have again the old complaints that were experienced with regard to the Sugg No. 1 argand burner and the wonderful sperm candle—which apparently each person could manipulate according to his own desire. There must be something certain upon this occasion. It must be something scientific if it was to be applied as a test; and, beyond this, it should be imposed impartially on all persons who proposed to supply heat and power. It should not be placed alone on one particular section of a great industry, but upon anyone, and any company, and any local body, any electrical undertaking, and producer gas undertaking, and any other concern which entered the field with a view to supplying heat.

Mr. H. D. Madden (Cardiff) remarked that this question of a calorific standard was one which, he thought, they all approached with some diffidence at the present time. He would, however, very much like to associate himself with some of the allusions Mr. Canning had just made to the standard calorimeter and the method of testing. This was a matter that they would have to turn their attention to in the near future. Whether the new idea would be followed up, they did not know; but they wanted to see that their feet were standing on firm ground before they made any rash move in the matter. They could not fix any ratio between the candle power and the calorific value of a gas. This had already been demonstrated. They knew that it depended upon the composition of the gas they sent out. As far as a calorific standard went, the keeping of the gas at a fairly constant thermal value seemed to be the best arrangement, rather than to have (say) 600 B.Th.U. one day, and 520 B.Th.U. the next, and then jump back again to the former figure. He did not know whether this provision was made to straighten out any such irregularity in value; but it seemed that with all lighting and heating power companies the standard of calorific value should be kept as uniform as possible from day to day. Until the matter had been gone into thoroughly, and a great deal of research had been carried out, he did not see that they could fix themselves to any firm theory. The question of the instruments had been referred to by Mr. Canning. He (the speaker) thought that this was a question they would have to leave for experimental work. There was the Simmance-Abady calorimeter, for instance. They were, to his mind, all very good; but this one was coated and jacketed very much like a steam-engine was jacketed to retain the heat; whereas the Junkers had a polished surface to prevent radiation. The Boys calorimeter was another instrument. Of course, the merits of each one would have to be gone thoroughly into if there was the expectation of a calorific power standard. They would require to know that they were getting 100 per cent. efficiency out of each calorimeter—he thought this was what Mr. Canning meant when he spoke of the different burners. They wanted 100 per cent. efficiency out of the burner; and they would want the same out of the calorimeter. Then there was another thing. Calorimetry was, like chemistry, an exact science. It could not be carried out in a haphazard way, but required to be done very carefully, without draughts, or anything of that kind. The conditions needed to be equal right through. All these matters, he felt sure, would have to be attended to. A further point of interest to everyone connected with the matter was the term "calories." To-day nearly everything was being termed calories. Now for their engine standard they had accepted the "British Thermal Unit;" and, of course, all units of heat and work were based in engine practice on the British Thermal Unit. But there seemed to be an idea prevalent that they should come to the calorie. The conversion could be easily made by the well-known factor of 3·97. Multiplying the calories by this would convert them to British Thermal Units; but they did not want to go backwards and forwards, if they could work direct into British Thermal Units. He thought this was a standard they should try to work to. There was another thing on the question of the calorific power of the gas which might materially affect the matter. He was referring to vertical retorts. How far was the calorific power going to be influenced of the gas that they would make under these conditions? What he had alluded to were some of the questions they would have to look at in following up a matter of very great interest. The questions of carbonization, which was undergoing such radical change, and the multifarious uses of gas for power and other purposes, must all of them be taken into consideration with the calorific value.

Mr. J. H. Canning (Newport) said he would like to refer to one of the most important points Mr. Madden had touched on. He had hinted that with the new developments taking place in connection with carbonizing processes—the introduction of the vertical retort and other matters—there was a fear that there might not be produced exactly the quality of gas that would conform to the standard. In his (the speaker's) opinion, a standard should not impose restrictions upon the development of an industry. It should rather follow it, where the developments were in the direction of improvement, as otherwise an ill-judged standard might impose an actual penalty upon the consumer. A second point which was very important was the management of the calorimeter. They all knew that the old illuminating power standard was really no exact standard at all. Nobody could define accurately what a candle was. Even the new pentane standard, with all the work that had been expended upon it, had been discovered to be extremely sensitive, for instance, to the smallest variation in the amount of moisture present in the atmosphere. If they were to have a new standard imposed, every care should be taken to see that it was a really accurate and scientific standard. In making calorific tests, he had had some small experience in the use of the Simmance-Abady calorimeter; and it was impossible to get accurate results unless the temperature of the waste gases, the temperature of the inlet water, and the temperature of the air in the chamber where the test was being made were approximately within a degree or two of each other. It was very difficult to see how this approximation was to be produced or maintained in normal working circumstances; and it was still more difficult to imagine any method of correcting for these discrepancies. To sum the whole question up, he thought that, to use a very ordinary expression, they should "be off with the old love before they were on with the new." They did know the evils of the present-day standard; but those of the new standard were,

comparatively speaking, unknown to them. A considerable trial should be allowed of the fresh conditions in London; and he was sure they might trust the Gaslight and Coke Company, with the public spirit that had always distinguished them, to communicate to the gas industry throughout the country, for the benefit of everyone, all possible information with regard to this standard. Then, after it had stood the test of time, they would be in a better position to understand what were its real advantages and its possible drawbacks.

Mr. J. C. PENNINGTON (Colwyn Bay) moved a hearty vote of thanks to the President for his opening remarks, which, he said, had been well commented upon by the various speakers. There was no doubt, as Mr. Madden had said, that this question was practically in its infancy; and they must keep an open mind on the subject for some time to come.

Mr. J. M. SMALL (Merthyr Vale) seconded, and said he would like to ask whether 125 calories would be considered high for ordinary coal gas, or would it be just medium?

Mr. CANNING replied that it would be pretty good.

The vote having been heartily accorded,

The PRESIDENT thanked the members for the kind way in which they had received his remarks. Proceeding, he said that in the case he had referred to Parliament had fixed the calories at 125; and then they allowed 10 per cent., which brought the figure to 112½. Then, again, after the experiment of three years, the Board of Trade might adjust the arrangement; so that everything was subject to practical experiment over a period of three years. This would give the Gaslight and Coke Company and the London County Council full opportunity to see whether any alteration was needed. At Tottenham and Edmonton, about two years ago, the Company agreed with the Local Authorities on a calorific value test—the standard (not a statutory one, but one carrying an agreed forfeiture) being 450 B.Th.U. Of course, it had to be remembered that they were making to-day a composite gas—a mixture of coal and water gas—and they were looking forward to the use of vertical retorts; but if a 14-candle standard town gas was anything like approximated throughout the country, there should not be any great difficulty in making a calorimeter that would form a satisfactory standard for testing such gas. The only place that he knew where the calorific test had been substituted for the old illuminating power test was in the American State of Wisconsin; but he had no details as to how they had found the change had worked there up to the present. He was sure they would all be interested to notice the progress of this innovation, when it was brought into use by the Gaslight and Coke Company.

THEORY AND PRACTICE OF ILLUMINATION.

This was the subject of a paper read a short time since by Mr. T. W. Rolph before the Physics and Chemistry Section of the Franklin Institute. The current number of the "Journal" of the Institute contains the text of the paper, and the following is an abstract.

The author begins by pointing out that, in any branch of engineering, practice usually precedes theory. As practice develops and becomes more widespread, its faults show themselves; and in the attempt to remedy them, theory is evolved. This reacts upon practice and improves it; while practice in turn reacts upon theory, causing a development of shorter methods of predetermining results. In the field of illumination, practice is several thousand years old; but theory is only beginning to be developed. Improvement of the early media of illumination was not accompanied by any great increase in the intrinsic brilliancy or intensity of light per square inch of lighting surface; and, consequently, a number of light sources were necessary when large areas had to be dealt with. Of course, it was a simple matter to place these lights wherever desired; and they could be moved from place to place to alter the lighting of an apartment. With the introduction of gas, and later the electric light, both of which are mostly used at fixed points, faults of location began to be apparent; and their recognition led to the study of this subject as part of the work of the designer of systems of lighting. The result was the development of the theory of illumination. Means of changing the natural distribution of light-sources were introduced; and they were followed by the publication of methods of measuring the intensity of light, and of calculating the amount necessary to obtain the required illumination.

In considering the theory of illumination, the first thing to be taken into account is the purpose of lighting. Its principal object is, of course, to enable the eye to see comfortably the objects illuminated. Hence we perceive at once that we have to deal with two factors—the eye, upon which the effect is produced, and the medium (light) producing the effect. To see any object, we must have light falling upon it, and being reflected from it to the eye. Illumination, as a branch of engineering, is peculiarly distinctive, inasmuch as it involves effects upon a human organ; and in order that his readers might better understand the problem before them, the author describes, by the aid of a diagram, the construction of the eye, and shows how, by means of the iris, the quantity of light to be allowed to pass in is determined. When the illumination is very low, and objects are dimly lighted, the iris is open to its greatest extent; but when the light is very brilliant, the iris shuts out as much as is possible. It cannot, however, exclude sufficient to prevent a strain upon the retina and consequently poor vision.

For the protection of the eye, several points should be considered in designing systems of lighting. The following are the most common causes of injurious effects: Too little or too much light, glare, flickering or striations, extreme contrasts, and reflection from polished surfaces. The first two of these causes are easily dealt with by the calculations of the engineer. Glare is a common fault, and it has worked untold injury to the eye. The author says some systems of lighting "appear to have been designed with the special object of adding to the prosperity of the oculist." Two simple considerations will furnish the means of avoiding injury: Keep the light-sources as far as possible above the direct range of vision; and diffuse, by a globe or reflector, the light from sources of high intrinsic brilliancy. Flickering, streaks, and striations of light cannot but be harmful to the eye; and the author cites the illumination of a book-keeper's desk as an illustration of the eye-strain caused by contrasts. This can be avoided by placing the light-source not in the middle of the desk or directly in front, but at the side.

After these introductory observations, the author proceeds to deal with the calculations necessary for arriving at the correct intensity and distribution of illumination; considering first the fundamental units of light—candle power, lumen, and foot-candle—and illustrating his remarks by diagrams. He then goes on to show the great improvement which can be obtained by properly calculating the lighting system of a room. The photometric curve of a bare lamp reveals the fact that practically the same amount of light passes above as below the horizontal. The former is useful only in illuminating the ceiling, and for lighting the lower part of the room by being reflected downwards; and when it is considered that the rays which pass upward are ordinarily reflected two or three times before reaching the lower part of the room, it becomes evident that the light is very largely wasted. Recent tests carried out by the author in collaboration with Mr. V. R. Lansingh,* on the effect of light and dark walls, ceiling, and floor, show that, under conditions by no means extreme either way, a difference of about 4½ to 1 can be obtained in the illumination resulting from the same lamp. In addition, when the efficiency of incandescent lamps is considered, we have the choice between carbon filament lamps in ordinary use, consuming 3·5 watts per candle, and tungsten lamps (recently introduced) which consume 1¼ watts It is possible, therefore, to obtain a difference of 13 to 1 in the cost of securing illumination by simply varying conditions which might appear trivial to one who is not familiar with the problem. This, the author remarks, is a remarkable state of affairs, and is without a parallel in other branches of engineering. We propose to give the rest of the paper almost in full.

Up to about ten years ago, practically no attempt was made to design a lighting system, to obtain uniform illumination of any desired intensity. The first method of calculating illumination was the "point-by-point" method, and consisted in assuming a certain lighting system, then finding the illumination at typical points in the room by means of the formula $I = CP \div d^2$ where I is the flux-density in foot-candles, CP the candle power, and d the distance in feet from the light-source to the point considered. Then if the lighting system was not good as shown by these calculations, it was changed, and the calculations were repeated. This was a rather laborious procedure; but the few men who used such calculations soon became experienced enough to design a system with little actual figuring, and they used the point-by-point method largely for checking.

Recently, however, a much shorter method of calculation, called the "flux" method, has been introduced. Its development is largely due to the work of Messrs. Cravath and Lansingh. By this method the flux, or quantity of light emitted from the light-source in useful directions, is used as a basis rather than the candle power or light-intensity in any direction. With small light-sources, the lumen or unit of quantity of light is the flux of light emitted in unit solid angle by a light having an intensity of one candle power in all directions. It so happens that this quantity of light, divided by the area of the surface which it strikes, gives the average foot-candle intensity of illumination on this surface.

This is a very convenient fact, and enables us to obtain the average foot-candle intensity in a room by simply knowing the total number of effective lumens and the area of the room. By "effective lumens" is meant the total quantity of light striking the plane of illumination, or, in other words, the total light generated *minus* that absorbed by the ceiling, walls, floor, and lighting accessories. The total number of effective lumens must be based upon some estimate as to what proportion of the light is effective; but we can work within a small limit of error when we know the photometric curve of the light unit and the conditions of the ceiling and walls. For example, with light ceiling and dark walls and prismatic intensive reflectors, we know that the effective light is the equivalent of the light emitted from the unit, up to about 75° from the vertical. We can find from the photometric curve the number of lumens produced by the light-source in this zone. The total lumens necessary is the product of the intensity of illumination desired and the area of the room. Knowing the lumens necessary and the effective lumens from each light-source,

* See "JOURNAL," Vol. CV., p. 621.

it is an easy matter to determine the number of sources required. These must then be placed in such a way that the illumination will be uniform. But this will not be difficult for one who is familiar with photometric curves. Mr. Norman Macbeth has determined the lumens per cubic foot of gas per hour for a large room with light ceiling, dark walls, and inverted gas-burners with prismatic reflectors. The value is 104. After the total watts or total cubic feet of gas per hour necessary have been determined, they must be divided up among the number of units desired, spaced in the proper manner. This method of calculating illumination promises to prove exceedingly valuable.

A paper of this kind is not complete without some consideration of various methods of equipping light-sources. Such equipment may be divided into three general classes—globes, reflectors, and shades. Globes are enclosing or partly enclosing accessories, which may or may not have a favourable effect upon the distribution of light obtained from the light-source. Reflectors change the distribution of light by means of reflection; and shades, as their name implies, have as an object the decreasing of the light intensity or the addition of some desired decorative effect. As a rule, they do not have any very favourable effect upon the distribution of light.

There are several kinds of enclosing globes in ordinary use; the principal ones being prismatic, opal, ground glass, and art glass. Neglecting the question of appearance, prismatic globes are superior to opal or ground glass, since their absorption is considerably less, and they are designed to send a large part of the light rays in a really useful direction. Prismatic globes such as the holophane, when designed and used correctly, absorb from 10 to 14 per cent. of the light. Tests on incorrectly designed prismatic globes have shown an absorption as high as 34 per cent. Opal absorbs from 25 to 60 per cent., depending upon the density. In order to obtain a desirable appearance, opal globes should never be used unless they are sufficiently dense to hide the outline of the lamp filament. Ground glass absorbs from 20 to 40 per cent. Art glass has a very high absorption, but is valuable in obtaining decorative effects.

There are a large variety of reflectors on the market, among which the most common are prismatic, opal, mirror, metallic, and coated. Reflection from any surface is of two kinds—regular or specular reflection and diffuse reflection. When a ray of light is regularly reflected, the angle of incidence is equal to the angle of reflection. With diffuse reflection, the light striking the surface is broken up into a large number of rays which leave the surface in all directions. Most surfaces give both regular and diffuse reflection with one kind predominant. Each kind of reflection has its advantage for certain cases. Certain types of distribution of light can be obtained only with surfaces giving specular reflection. On the other hand specular reflection with filament lamps often produces bright streaks or striations in the illumination of a surface. These can be eliminated by using frosted lamps, and in some cases bowl-frosted lamps. Completely frosted lamps are usually undesirable, because frosting reduces the life of the lamp about 50 per cent. Where the reflection is diffuse, striations are not usually met with.

With prismatic reflectors, it is impossible to direct downwards all the rays of light. This quality is not objectionable, however, for general illumination, since it is desirable to have a certain amount of the light pass upward in order that the ceiling and upper walls may not be in darkness. Prismatic reflection is specular reflection. It is therefore possible to direct a light ray in any direction; and a prismatic reflector can be constructed to give practically any desired distribution of light. Mirror reflectors differ from prismatic reflectors in that they do not allow any light to pass upward. Reflection here is specular also, and therefore such reflectors can be designed to give nearly any desired distribution. The fact that they allow no light to pass upward makes them objectionable for general illumination, though a system of indirect illumination recently introduced makes use of mirror reflectors.

Opal reflectors are, as a general rule, found to be fairly efficient; but they differ from prismatic and mirror reflectors in that the reflection obtained is diffuse and not specular. This means that only photometric curves of a general rounded shape can be obtained. Opal reflectors having a depolished interior surface have recently been introduced. This surface practically eliminates striations in the illumination obtained. These reflectors present an attractive appearance, and have a good efficiency when used with clear lamps. Metal reflectors can be obtained in a large variety of styles and sizes. Their principal use is for factory lighting, though iron reflectors with a coating of white enamel are used considerably for streets. Reflectors for factory lighting are usually of aluminium, brass, or steel. With such reflectors, a diffuse reflection is highly desirable. This is usually obtained by means of a depolished aluminium surface or by aluminium paint.

Illuminating engineering covers so broad a field, that this paper can do no more than touch upon a few of the essential features. Though the work of the illuminating engineer is comparatively new, it has proved so valuable that the development of the science and art has been exceedingly rapid. The literature on the subject has already assumed large proportions, and each year sees additions of great value. There is much work yet to be done before illuminating engineering is fully recognized as an important factor by all parties concerned; but at the present rate of advancement this complete recognition is not far off.

NATIONAL CONSUMPTION OF WATER.

At the Meeting of the Royal Statistical Society on April 27, Mr. W. R. Baldwin-Wiseman presented a long paper on "The Increase in the National Consumption of Water," of which he read and summarized the principal portions—prints having been supplied to the members.

After having given some interesting historical particulars in regard to water supply, the author passed on to deal with the growth of the population in England and Wales, which, he said, was shown by the advance from 2·25 millions in 1377, to 5·24, 8·89, and 32·53 millions respectively in 1710, 1801, and 1901. Great as this increase had been, it had been still greater in the case of urban populations, which had grown from 1·24 millions in 1696, to 10·93 and 25·05 millions respectively in 1861 and 1901. These enormous increases were exceeded by the rate of increase in the population supplied with water from established works in the various decennial periods of the Nineteenth Century. London, he pointed out, had increased from an area of 0·3 square mile in 1200 to one of 117 square miles in 1908; while the annual supply of water at present was about 82,125 million gallons. Similarly, Liverpool had increased in area from 0·1 square mile in 1300 to to 27·8 square miles in 1905, and the population had grown in the same time from a few hundreds to 739,000 people; while a population of about 907,000 were now dependent on the Corporation water-works for a supply of about 10,801 million gallons a year. Manchester also had extended its municipal boundaries, so that from an area of 9·3 square miles in 1841 they now embraced an area of 31·1 square miles, with a population of about 649,000; while a population of about 1,250,000 were dependent for their annual supply of 14,615 million gallons on the Corporation water-works.

In conclusion, the author emphasized the desirability of steps being taken at an early date to form some central authority charged with the duty of water conservancy in its widest application; and for this purpose they should engage in a close and exact study of the water resources of the country. Such an authority could, he said, co-ordinate its work with, and also supervise, that of water supply and sewage disposal authorities; also that of river conservancy, rivers pollution and fishery boards, county councils, and other authorities who might likewise furnish some annual returns. The water supply data collected by the officers of the Geological Survey might also be handed over to this authority. It should collect systematic data on rainfall, &c., and should also invite voluntary contributions of data as to the water levels at various periods, together with a continuous record of the quantities pumped from various private wells. The authority should publish an annual report, and there would thus, in the course of a few years, be available a mass of well-digested and reliable information, which would aid and guide all interested in an economical development of the water supply of urban areas or of estates; while at the same time there would be a special department available to advise Parliament as to the economy or otherwise of the schemes of water supply, sewage disposal, and river regulation laid before it—thus ensuring for future generations the mechanism for the most efficient and economical administration of the national water resources—a matter of the most supreme importance.

The paper was accompanied by a mass of valuable tabulated statistics, showing the estimated population of England and Wales in the pre-censal period; the distribution of the population in pre-censal and censal years and at the taking of the last two census returns; the population in 24 towns at various times from 1085 to 1908; the area within the municipal limits and water-supply districts at different times; the water supply in certain towns and districts; and the rate of increase in the annual water supply in various periods.

The paper was followed by a discussion, in the course of which approval was expressed of the author's suggestion in regard to the formation of a central authority; Dr. H. R. Mill specially urging that the collection and tabulation of rainfall statistics, which is now carried on under his supervision, as Director of the British Rainfall Organization, should be in the hands of such a body. At the close of the discussion, thanks were accorded to the author for his valuable communication.

Explosion Waves in Gases.—At the recent conversazione of the Royal Society, Professor Harold B. Dixon, F.R.S., exhibited some interesting photographs showing the generation and nature of explosion waves in gases. They were taken on films moving with a uniform downward velocity (between 50 and 80 metres per second). The explosions, started by electric sparks, travelled along horizontal glass tubes. The photographs obtained are thus compounded of the horizontal movements of the flame and the vertical movement of the film. This analysis reveals the slow initial movements of the flame, the sudden setting-up of the explosion wave, and the remarkable effects of "reflected waves." Explosive gas mixtures were also fired by rapid compression with a steel piston. The photographs showed clearly that the gases are fired at a single point, and that they are not instantaneously fired throughout.

COKE-OVEN GAS AND GAS-ENGINES.

In the "Bulletin" just issued (for February last) of the French Society of Civil Engineers, a paper by M. Cuvelette, on "The Direct Use of Coke-Oven Gas in Explosive Engines," takes up about fifty pages. The contribution is a comprehensive one over a considerable field, which is likely to become increasingly important in one way or another. In view of this, and also because of the intimacy of the gas-retort and coke-oven problems, the following much condensed abstract of the article is given.

The problem of the direct utilization of gas from certain industrial operations—blast-furnaces, coal carbonization, and the like—came to the front about 1898, with the appearance of the large gas-engine for blast-furnace gases, due to the combined efforts of M. Delamare-Deboutteville and engineers of the Société Cockerill. On Nov. 20, 1899, such an engine of 600 H.P. was started at the Seraing Works. The results were striking. The thermal yield of the gas-engine was found to be 30 per cent.; while that of the steam-engine was not more than 12 per cent. The metallurgical industry at once saw that here was an important development. A blast-furnace of 100 tons daily output of metal would provide a disposable horse-power of about 2000. At first, there was exaggeration. A young industry, like young humanity, has illusions and great hopes. The drawbacks of dust-laden gases were not realized; and it was thought that special purification was not indispensable. This was a serious mistake; and at one time it seemed as if it would prevent the new engine being a success. But to-day these difficulties have been overcome. Centrifugal fans, the admission of water into the dust, followed by finishing apparatus, reduce the amount of dust to 0·02 gramme per cubic metre. The power of such engines is now reckoned in hundreds of thousands of horse-power; and one American steel works, the Illinois Steel Company, has 120,000 H.P., and before long will have 250,000 H.P.

A priori, the case of coke-oven gas should be comparable to that of blast-furnace gas, notwithstanding their great difference in calorific power. One ton of metal made in a blast-furnace corresponds to 4500 cubic metres of gas at 900 calories, half of which escapes. The usable amount is 900 × 2250 = (say) 2,000,000 calories. The coke necessary for the production of this ton of metal requires 1½ tons of coal, releasing 450 cubic metres of gas at 4500 calories. If 40 per cent. of this volume was disposable, as it would be with regenerative ovens, the surplus gas contains 720,000 calories. This figure may be increased by about one-half, for coke is used for other purposes—cement, sugar, &c.—and so, under favourable conditions, a thermal energy of about half that of blast-furnaces may be reckoned as available. Needless to say, the coke-oven gas-engine is far from realizing this position at present; but progress has been made, and will continue in the future.

Different Types of Coke-Ovens.

The carbonization of coal for the production of coke is carried on in a closed vessel—being effected at a very high temperature and continued sufficiently long to eliminate all volatile matter from the coal. Up till recently, there were baker's ovens or beehive ovens, two types of which there are still numbers in England and America, but which are bound to disappear: (1) The ordinary coke-oven (fig. 1), in which all the gas produced passes

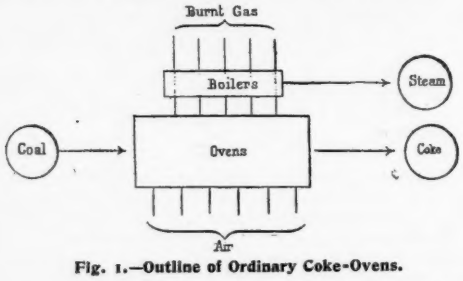


Fig. 1.—Outline of Ordinary Coke-Ovens.

through the walls of the oven after leaving the carbonizing chamber, and at the outlet of the flues is led under the boilers. Thus, coke and steam are obtained, but no surplus gas. (2) The regenerative bye-product oven (fig. 2), in which the gas is sent into

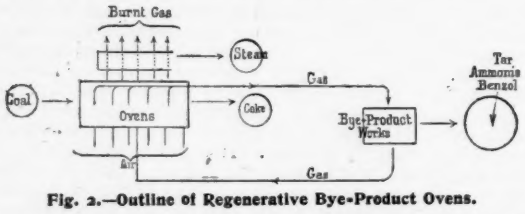


Fig. 2.—Outline of Regenerative Bye-Product Ovens.

a works where the bye-products condensable at ordinary temperature, such as tar, ammonia, and benzol, are obtained. The gas then returns to the oven for the carbonization of the coal; and the burnt gases, as in the preceding case, are used under the boilers to produce the steam. Thus are obtained coke, tar, ammonia, benzol, and steam; but no surplus gas.

At the beginning of the coke-oven industry, coal having 20 to 21 per cent. of volatile matter was employed; but with the great developments and demands for coke of recent years, richer coals, having 30 to 32 per cent. of volatile matter, have had to be used. [In 1885, the production of cast iron by the principal countries was about 20,500,000 tons; in 1906, it was 58,450,000 tons, almost three times as much.] From M. Bousquet's "Les Fours à Coke Modernes," the following figures are taken, representing the number of calories produced by carbonizing 1 kilo. of dry coal—*i.e.*, the number of calories given off by burning the gas made by the carbonization of this one kilo. of coal: Eschweiler coal, 1·094; Baaker Mulde, 1·100; Erin, 1·313; Osterfeld, 1·324; Holland, 1·388; Pluto, 1·413; Mathias Stinnes, 1·485.

In the Pluto mine, the division of the heat produced per kilo. of coal was: Heat produced, 1400 calories; heat used, 660 calories, or 47 per cent.; heat disposable, 740 calories, or 53 per cent. The 660 calories used were divided up as follows:—

Lost by radiation	246·5 c., or 35 per cent.
Taken by the coke	135·5 c., or 20 ,, ,,
Taken by volatile matter . .	180·2 c., or 30 ,, ,,
Taken by gas burnt, independent of the boilers. . . .	99·0 c., or 15 ,, ,,

This disposable heat of about 50 per cent. can be utilized in two different ways. It can be consumed altogether in the oven-flues and a larger amount of steam raised, or part of the gas can be separated for other purposes and only what is strictly required for the operations led to the ovens. By this means is obtained what in English is known as the "surplus gas," which has filled an important place in the technical literature of recent years. Engineers gave it their attention for two reasons—first, that if this gas was utilized in an engine there would be an advantage to increase the amount of it; and, secondly, because of new ideas which certain gas technicians, more particularly in England and America, believed about 1900 to be advantageous. M. Marquisan has recently fully considered this second aspect of the question.* One started from the idea that the gas-retort had had its day, and that the coke-oven would supply the model for a gas-oven fulfilling all requirements and engaging the attention of the gas industry. There were already some examples of coke-ovens in coal districts providing the lighting of towns (Cie. de Blanzy at Montceau-les-Mines, the Erin Colliery at Castrop, &c.).

To make town gas in a coke-oven can be achieved in two different ways, according to the heating of the ovens. Either a part of the gas of the carbonizing can be used, or gas can be made in a producer. It is the second method which shows a tendency to prevail—*e.g.*, in the ovens at Munich; but it was the first which was originally considered, and which gave rise to the idea of such surplus gas being used for lighting purposes. What then, in the carbonization of coal, is the amount of gas which can be allocated for another purpose beside that of heating regenerative bye-product ovens? It would be a great mistake to suppose that the above figure of 53 per cent. represents the surplus gas. After some calculation, it is said that with coals having even 20 to 21 per cent. of volatile matter, there is no surplus gas. With coals of 25 per cent. of volatile matter, M. Reumaux, in various tests at the Mines de Lens, has found an excess of 12 per cent. under the following conditions:—

Coal in oven	7 tons; 25 per cent. volatile matter.
Moisture	10 per cent.
Ash	9 ,, ,,
Three burners.	7 air inlets per oven.
Temperature of air	320°
,, ,, gas	50°
Duration of charge	36 hours.
Thickness of flue walls	13 centimetres (5⅛ ins.)

Production of 325 cubic metres (11,662 cubic feet per ton) of purified gas of a density of 0·482 per (metric) ton of coal carbonized.

With coal still richer in volatile matter, the quota disposable is higher, and may be 20 per cent. But exaggeration is to be avoided; and if higher figures are given, as at Halifax (by M. Dumuis: "The Use of Coke-Oven Gas for Lighting, Heating, and Gas-Engines": Comptes Rendu of the Société de l'Industrie Minérale, June, 1900) with ten Semet-Solvay ovens × 9 × 1·70 metres × 0·420, carbonizing 4500 kilos. of coal in twenty-four

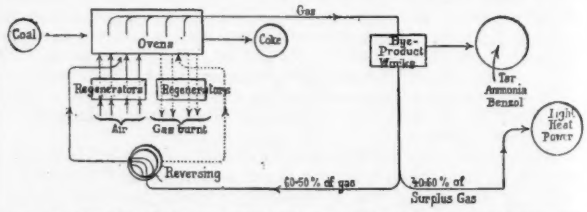


Fig. 3.—Outline of Regenerative Bye-Product Oven, with Regenerators.

hours, giving 32·26 per cent. of surplus gas, regard must be paid to the duration of the working. In the last hours of carbonization, the quantity of gas given off is below that which is required

* See "Journal," Vol. CII., p. 629.

for heating. The proportion of gas disposable can therefore be increased by stopping the working sooner; but the coke made would be less carbonized and of less value for use in a blast-furnace.

But there is a means of increasing the production of surplus gas. This is by applying to the coke-oven the principle of the Siemens regenerator, a combination which was first effected in 1881 and was due to Hoffmann, the inventor of the Otto-Hoffmann oven. The gas from such ovens is, as before, treated in bye-product works. But from there only a part of it returns to the ovens; the remainder, being the surplus, can be used for lighting (as at Glasport, Boston, Rheinelbe installation at Gelsenkirchen), heating at a distance (as in the Lackawanna Iron and Steel Company's works at Pittsburg), or, lastly, for motive power. An oven so designed is called a regenerative bye-product oven, with heat regenerators, to distinguish it from types (1) and (2) previously mentioned. The outline of it is shown in fig. 3. At first, both gas and air were made to circulate in the regenerators, as in the Martin oven or the Siemens glass-furnace; so also in the original Otto-Hoffmann ovens. But heating the gas was soon given up. There was serious danger in heating up a gas so rich in hydrogen as coke-oven gas. Further, it was not necessary, as the combustion of air and gas, without preliminary heating, was enough to attain the necessary temperature; and it was a saving in gas, not a high temperature, that was desired. Also with the high calorific power of coke-oven gas, there was less reason for heating it than with producer gas, of which the calorific power is from three to four times less. Now only the air is heated; and these regenerative ovens are distinguished as cold-air ovens or hot-air ovens.

Regenerative Ovens.

Regenerators may be arranged in two ways—collectively for a bench, or separately for each oven. Of the former type, are the Otto and Coppée ovens; of the latter, the Koppers ovens. Fig. 4 shows an

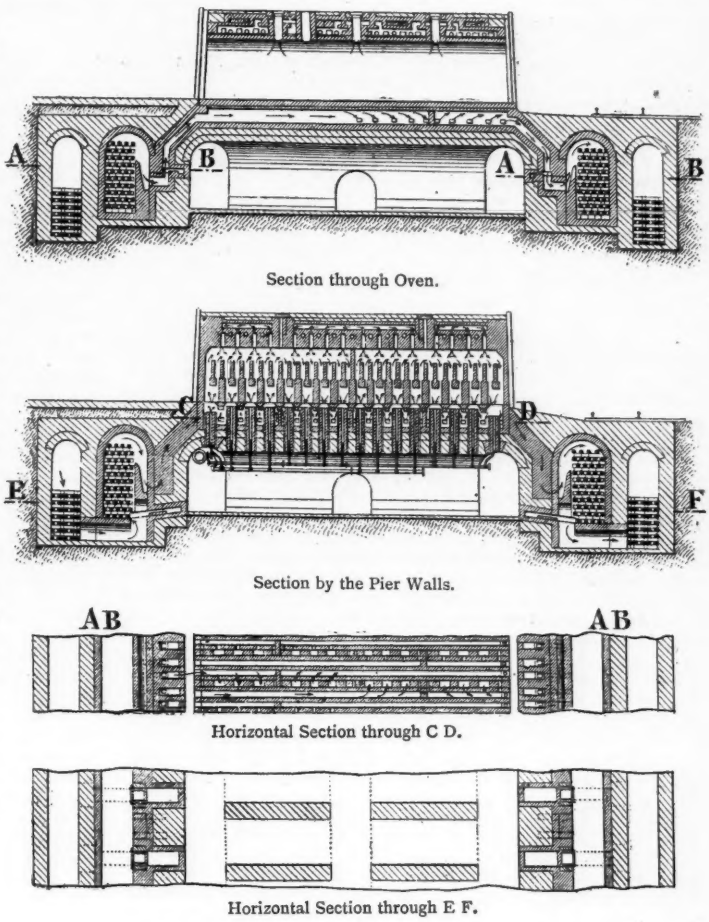
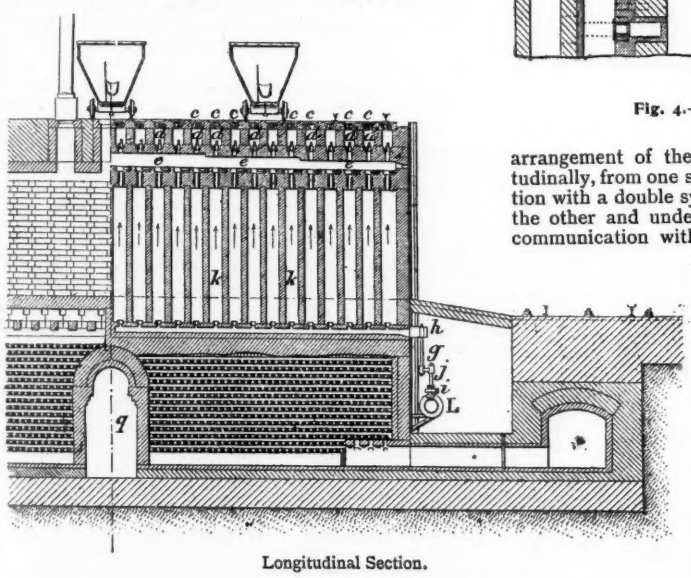


Fig. 4.—Sections of "Otto" Regenerative Ovens.



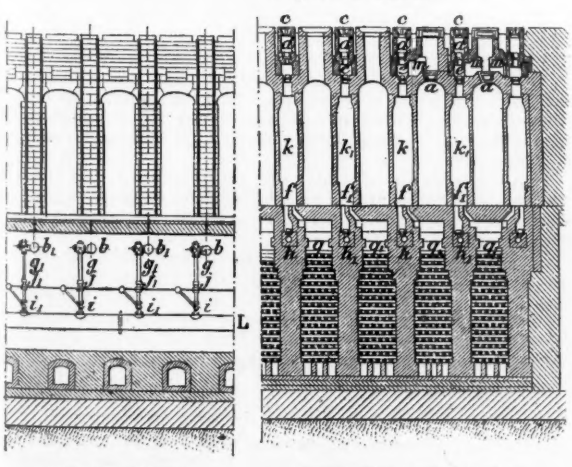


Fig. 5.—Section of "Koppers" Coke Oven.

arrangement of the Otto ovens. The regenerators are arranged longitudinally, from one side to the other of the bench. They are in communication with a double system of horizontal flues placed from one front wall to the other and under the floor of the ovens. These flues are likewise in communication with the points at which the gas issues. The whole is arranged so that at any given moment only one half of the vertical flues are supplied with gas. The burnt gases go up the flues, pass down again through those next to them, reach the second horizontal flue, and from there the regenerator of the other side of the oven, and so to the chimney. When the regenerator, where the air circulates, is cooled down to a certain degree, a reversion takes place. The other half of the flues is, in its turn, fed with gas and air, and the cooled bulk receives the burnt gases, which return the calories taken up by the air in the first operation. In the Otto oven, there are about sixteen vertical flues.

Fig. 5 shows the construction of a Koppers oven with a special regenerator to each oven. The whole mass of the oven is divided into two parts by a horizontal plan at the height of the floor. The lower part comprises the regenerators, and the upper part consists of the oven itself. The division-wall of the ovens has thirty vertical flues, all of the same section, with the exception of the two end ones, which are rather larger. The gas arrives at g and passes into the horizontal ducts h and h_1, arranged at the bottom of each division, and are distributed in the flues k. It is there brought into contact with the hot air arriving through the openings f. The burnt gases collect in the horizontal passage e, pass down the flues of the other half, and through the regenerators, where their heat is given up before reaching the chimney. Every half-hour the passage of the gas and air is automatically reversed. At the top of the flues are small fire-brick dampers c, which allow of regulating the chimney draught so as to get a uniform pull over all the flues. In the first Koppers ovens, the capacity of the regenerators per oven was 2·4 cubic metres; and the bricks were so arranged as to give a contact of 33·6 square metres. In the latest type, the capacity is 5·48 cubic metres per oven, and the regenerative surface is about 76·7 square metres.

Calculations show that if with an ordinary waste-gas oven the proportion of surplus gas is either nothing or 10 to 20 per cent., with regenerators it would be 35, 41½, or 48 per cent. in each corresponding case. These figures are realized in actual working. One oven can carbonize 8 tons in 36 hours. At 300 cubic metres of gas per ton of coal (10,765 cubic feet), the excess would represent 640 cubic metres (22,600 cubic feet) per twenty-four hours,

or 26·6 cubic metres (say, 940 cubic feet) per hour. It is easy to get the kilowatt-hour with 1 cubic metre of gas at 4000 calories; per oven there would be about 25 k.w.h., and each ton of coal carbonized would produce 120 kilowatt-hours.

The author then proceeds to explain the practical necessity of specially purifying the gas for its use in gas-engines; but as these observations are largely similar to coal-gas purification, they need not here be further dwelt upon. But he gives some figures of the purifying surface required that may be quoted:

Power of Engines.	Purifying Surface.	Surface per 1000 H.P.
600 H.P. ..	27 sq. metres ..	45·0 sq. metres
1500 ,, ..	32 ,, ,, ..	21·3 ,, ,,
1840 ,, ..	32 ,, ,, ..	17·8 ,, ,,
3000 ,, ..	60 ,, ,, ..	20·0 ,, ,,
3600 ,, ..	240 ,, ,, ..	40·0 ,, ,,

Attempts have been made, especially in England, to effect great simplification and saving by wet purification; but not with much success. At the Mathias Stinnes Mine, near Essen, the gas is passed through a washer filled with water pregnated with hydrated oxide of iron, forming a precipitate of sulphate of iron. When the deposit is sufficient, the apparatus is changed; being worked up by compressed air to revivify the oxide. But it is not a practical success. It is to be hoped, however, that the costly and cumbersome purifier-boxes are not the final solution of the problem.

Next is considered, from the mechanical point of view, the use of coke-oven gas in gas-engines. Coke-oven gas is distinguished from lighting gas by its having fewer heavy hydrocarbons and less methane, and more hydrogen and nitrogen. The following analyses are given:—

Coals.	H.	CH_4.	C_mH_m.	CO.	CO_2.	N + O.
Eschweiler . . .	56·7	22·4	1·3	5·5	2·0	12·5
Consolidation . .	48·9	35·8	3·2	7·2	0·7	3·7
Rheinpreussen . .	55·4	31·16	0·83	4·48	1·9	11·3
,, . .	45·6	24·4	0·7	5·5	2·9	20·7
Hibernia	48·0	22·0	2·0	5·5	2·0	29·6
Lens	58·0	20 0	1·5	6·0	3 0	11·5

The lower calorific power (latent heat not included) varies from 3600 to 4000 calories. At Lens, contrary to the general view, there is great regularity in the calorific power of the gas at different hours of the day; the variation generally being less than 5 per cent.

The essential conditions of good working with engines using coke-oven gas are: (*a*) To use a perfectly purified gas; (*b*) to have perfectly clean cylinders and explosion chambers; (*c*) to have an experienced staff of workmen to look after them.

The following diagram (fig. 6) is instructive, as showing the average composition of the different gases used in gas-engines.

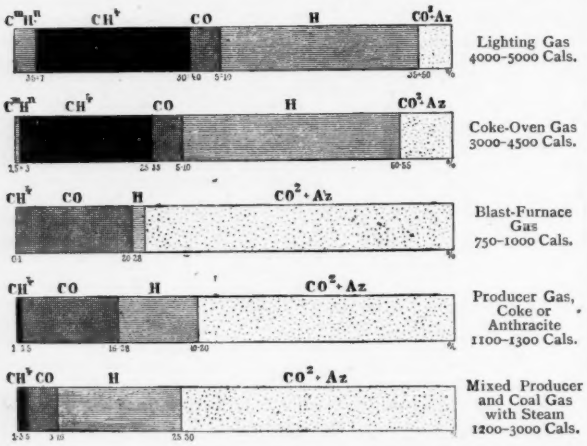


Fig. 6.—Average Composition of Gases Used in Engines.

Several pages are next devoted to mechanical details of gas-engines for use with coke-oven gas, their regulation and economical working. Lastly, short descriptions are given of actual installations at work, such as those at Lens; detailed figures of the plant being set out, together with a general plan of the works.

The whole contribution of M. Cuvelette, dealing as it does with a somewhat novel and an increasingly important subject, is well worthy of attention by all interested in the developments of coal carbonization.

Vertical Gas-Retort Syndicate, Limited.—Under this title, a Company was registered on the 13th inst., with a capital of £5000 in £1 shares, to manufacture under licence from the Dessauer Vertikal Gesellschaft, m.b.H., of Schoneberger Ufer, 25, Berlin. The principal subscribers for shares are Mr. Charles Hunt, who takes 1400, and Mr. Samuel Cutler, who has 1000. Mr. Clifford Hunt is Secretary of the Syndicate, whose registered office is No. 17, Victoria Street, S.W.

SLOT-METER SYSTEM.

By Edward A. Harman, M.Inst.C.E.

[A Paper read before the Manchester District Institution of Gas Engineers, May 22.]

The subject of this paper becomes of greater importance every year. Since the introduction of the system, its development has been phenomenal, requiring an evolution and a revolution in distribution and collection.

It is safe to affirm that the fostering of the slot-meter business has brought about an entire change in the relations between gas undertakings and their consumers. Instead of an attitude of independence towards consumers, and of indifference as to what uses were made of gas, one of active interest has taken its place. Every effort is now made to demonstrate the advantages of gas, and authorities interest themselves in ensuring that the most up-to-date and efficient appliances can be readily obtained. The supply of cookers, fires, wash-boilers, and the maintenance of incandescent burners upon easy terms, afford a sufficient illustration of this modification in the policy of gas authorities.

The author considered that a short contribution might perhaps be of service in eliciting experience upon many points of importance. One advantage the subject possesses is that managers of small works are as competent to discuss it and add valuable information thereon as those in charge of larger undertakings. He, therefore, proposes to state his own experience in a few facts which may form a basis for consideration, rather than a treatise upon the whole subject. No originality is claimed; but if any of the methods described in this paper, or brought out in subsequent discussion, are found suitable for adoption elsewhere, a useful purpose will have been served.

It will be generally recognized that different districts require different treatment; and it is with the object of obtaining the experience of other districts that this paper is submitted. Some systems used in one part of the country would be quite useless if tried in another, and *vice versâ*. The author is not so infatuated with the slot-meter system as to be blind to its defects, and many objections might be named. To the working classes the introduction of the slot-meter system has proved an inestimable benefit, by putting within their reach a safe illuminant, and thus abolishing the dangerous petroleum lamp.

A dozen or more years since, the general attitude of gas authorities towards the system was hardly serious; but to-day few undertakings can afford to ignore it. In August, 1896, as an experiment, the Huddersfield Corporation purchased five dozen slot-meters, since which date up to the end of March last, the number fixed amounts to 15,624.

Form "A" shows the progress of the system for the past twelve years.

Form "A."

Year Ending March 31.	Number of Slot Consumers.	Number Added in Year.	Gas Sold through Slot-Meters.		Per Cent. of Total Sold.
			Cubic Feet. Thousands.	Cubic Feet Per Meter.	
1897	425	425	802	1,890	0·15
1898	1,259	834	6,127	4,870	1·23
1899	3,197	1,938	23,714	7,420	4·40
1900	4,595	1,398	44,533	9,690	7·70
1901	5,651	1,056	59,151	10,470	10·53
1902	7,033	1,382	79,314	11,280	13·97
1903	8,476	1,443	90,986	10,730	16·18
1904	9,893	1,417	111,699	11,290	19·11
1905	11,505	1,612	130,179	11,315	21·52
1906	12,713	1,208	149,935	11,715	24·02
1907	13,651	938	169,998	12,450	24·83
1908	14,717	1,066	191,900	13,040	26·46
1909	15,624	907	214,299	13,715	28·75

The Huddersfield Corporation do not supply any internal gas-fittings, but lay the service pipe, and fix a meter and cooker free of charge. It will be seen that either the landlord or the tenant must instal the necessary internal gas-fittings according to requirements.

It is generally found that a gas-cooker is desired; and at the present time there are 12,424 slot cookers in use. Many slot consumers prefer to hire a larger cooker, as the ordinary stove-hire rentals are very reasonable.

When a new consumer applies for a supply of gas through a slot meter, an agreement is negotiated binding payment for all gas consumed at the customary charge of 30 cubic feet per 1d. (excluding the rebate). It also stipulates that 48 hours' notice be given when desirous of ceasing to burn gas, as per agreement Form "B." For exchanging an ordinary for a slot meter, a charge of 2s. 6d. is made.

Form "B."

Agreement for Prepayment Meter and Cooker.

*Huddersfield*_____ *190*

To the Huddersfield Corporation Gas Department.

Please supply gas to the above premises at the rate of 30 cubic feet for one penny as registered by the automatic meter—this charge to include

FORM "C."—*Name of Street.*

Date.	Name of Consumer.	No. of House.	Size of Meter.	No. of Meter.	Date. Meter Indication.	Cash in Box.	Date. Meter Indication.	Cash in Box.	Date. Meter Indication.	Cash in Box.	Date. Meter Indication.	Cash in Box.

FORM "D."

Date.	Indications.	Consumption.	Money Value. £ s. d.	Date Collected.	Cash in Box.	Short.	Over.	Remarks.

FORM "E."—*Prepayment-Meter Cash-Book.*

Date.	Folio.	NAME.	Consumption.	Amount Due.	Cash in Box.	Total Consumption.	Total Amount Collected.

the rent of the meter, cooker, fittings, &c., which will remain the property of the Corporation. I undertake not to disconnect, nor allow any person other than a servant of the Corporation to disconnect, or remove them.

I hereby agree to pay a minimum amount of six shillings per annum into the meter (in lieu of rent), failing which, I guarantee to pay the balance upon demand.

In the event of my leaving the premises before the expiration of a year, providing the cash paid by me into the meter-box does not amount to six shillings, I agree to pay the balance forthwith.

I also agree to keep the cooker and apparatus clean and in thorough working order during the whole time it is in my possession, and further agree to pay for any damage which may be done to the same—ordinary wear and tear excepted.

I agree to your inspectors entering my premises at all reasonable times to collect the money, inspect, repair, or renew the meter, cooker, fittings, &c.

Before leaving the premises, I undertake to give you 48 hours' notice.

In case of any defect in the automatic arrangement of the meter, whereby gas passes without prepayment, or by which an incorrect quantity is given for a penny, I agree to be charged by the meter index.

Signed _____

Date _____ *190*

The Corporation, by the undersigned, engages to supply the gas upon the terms and conditions above mentioned.

Witness _____

The slot-meter collectors' duties are so arranged that one man does not empty the same meter on two consecutive occasions. Thus each inspector constitutes a check on the indication previously taken. The inspector first enters the indication of the meter in a book provided for the purpose. He then takes the money from the box, and makes it up into five-shilling bags, for which there is a ready demand from the shopkeepers in the district. Paper bags are provided, which each inspector after filling has to initial. The inspectors leave the works at 8.30 a.m. and return about 4.30 p.m.

The meter indications are entered from the inspector's book, Form "C," into the meter books; the consumption cast out; and the amount due, together with the cash actually received, entered in separate columns, Form "D." At the same time the consumer's name, the gas consumed, cash due and received, are entered in the slot cash-book, Form "E." Four clerks thus dispose of the work of eight inspectors in forty minutes. In the case of any disparity between the amount collected from the meters and that brought into the works, the inspector is held responsible.

The system of disposing of the copper to the various tradesmen has proved to be a practicable working arrangement, not only in preventing the trouble of a large quantity of copper having to be dealt with at the office, but also in accommodating the shopkeepers with change.

FORM "F."

Year ending March 31.	Amount Collected.	Price.
1897	£133	25 cubic feet per penny.
1898	1,021	do.
1899	3,308	From April, 1899. 30 cubic feet per penny.
1900	6,123	do.
1901	8,133	do.
1902	10,905	do.
1903	12,510	do.
1904	15,513	do.
1905	18,080	do.
1906	19,492	From January, 1906. 33 cubic feet per penny.
1907	21,642	do.
1908	22,210	From April, 1907. 36 cubic feet per penny.
1909	22,322	From April, 1908. 40 cubic feet per penny.
	£161,392	

Form "F" shows the prices charged for gas from March 31, 1897, and also the amount of money collected from the slot-meters. It will be observed that the price first charged for gas was 25 cubic feet per 1d.; and the quantity was increased in April, 1899, to 30 cubic feet per 1d.—the meters being altered to give this quantity. In January, 1906, the number of cubic feet per 1d. was increased to 33.

Previous experience having proved that to alter the mechanism of the meters was a formidable task, it was decided to adopt as an experiment a discount system of 1d. for every 1s. deposited in the meters. In April, 1907, the gas supplied was increased to 36 cubic feet per 1d.; and the discount returned was increased to 2d. for every 1s. deposited in the meters. In April, 1908, the number of cubic feet per 1d. was further increased to 40; and a discount of 3d. in the shilling allowed.

It may be mentioned that the discount or rebate system is exceedingly popular. The reduction in charges would not have been appreciated so much if the meters had been adjusted to pass the gas actually charged for. The return of 5s. for every £1 paid into the meter is an apparent and tangible reduction. To those familiar with the dividend system in vogue with the Co-Operative Societies in Northern towns, this point will be fully appreciated.

Cases of tampering or breaking into the meters are few and far between. The consumer, having a monetary interest involved in the meter, is careful to give due notice of removal or anything wrong with the meter.

Another great advantage derived by the gas authorities is the provision made by consumers for access to be had to their meters, when the inspector is due in any district. The trouble in obtaining access to the gas-meter in houses which are often locked up during the daytime is well known.

Form "G" shows the statement of gas sold for all purposes. The total quantity sold for all uses in the year 1897 amounted to 516 million cubic feet; and in the year 1909, to 745 million cubic feet—an increase of 229 millions, or about 44 per cent. It will be noticed that the increase is only a trifle more than the gas sold through the slot-meter system during the year ending March 31 last.

FORM "G."—*Year ending March* 31, 1909.

Gas sold for lighting purposes at 2s. per 1000	235,132,800 cubic feet.
Gas sold for stoves and power at 1s. 6d. per 1000	247,263,400 cubic feet.
Gas sold for stoves and power at 1s. 2d. per 1000	368,400 cubic feet.
	247,631,800 cubic feet.
Gas sold through slot-meters at 2s. per 1000	214,299,700 cubic feet.
Gas sold for public and private lamps	48,336,000 cubic feet.
Total gas sold	745,400,300 cubic feet.
Increase over previous year	20,397,300 cubic feet.
Increase per cent.	2·81
Total number of gas consumers through ordinary meters	12,925
Total number of gas consumers through slot-meters	15,624
	28,549

One great advantage the slot-meter consumer derives is the absence of a gas account; and another is that in the event of any serious leakage in the gas-fittings only a limited quantity of gas can escape before the supply is shut off. Consumers are also assisted in checking the quantity of gas used, which leads to the prevention of waste.

That the system has disadvantages and difficulties still to be overcome does not need emphasizing. The method of payment by its very nature involves a complicated system of house-to-house visitation frequently for small amounts of money. Awkward moments arise when an exciting search has to be made for a penny to prevent the house being plunged into darkness. In some towns banks have refused to accept the copper. This has caused a difficulty in changing it, and the gas authorities have been compelled to accumulate large quantities—necessarily involving

a loss of interest. The accumulation of money (in a slot-meter) inclosed in most cases by a frail tin box is undesirable; but, as already pointed out, this difficulty has been entirely overcome in Huddersfield by the adoption of the discount or rebate system.

Fortunately in Huddersfield there is only one charge for gas through slot-meters; but the author is alive to the difficulties experienced where a scale of differential prices has to be adopted for the use of gas cooking-stoves, fittings, &c.

It is apparent that the system of changing the copper upon the district does away with the provision of hand-carts, mechanical coin counters, &c.

Occasionally, the prepayment part of a meter fails to cut off the supply of gas when the measured quantity has passed through, and the meter will deliver gas without money being inserted. A clause, therefore, is included in the slot-meter agreement to deal with this deficiency, as will be seen upon reference thereto. When such a contingency arises, a demand note for the amount owing is made out to the consumer.

It has also been found desirable to have a clause in the agreement providing that a minimum amount of 6s. per annum must be paid into the meter by the consumer (in lieu of rent), failing which, the balance must be paid on demand.

The Huddersfield Corporation have adopted a system of paying for the meters out of revenue.

The prices of gas supplied through ordinary meters are as follows: For lighting purposes, 2s. per 1000 cubic feet; for stoves and engines, 1s. 6d. per 1000 cubic feet—both prices subject to 5 per cent. discount for payment within one month.

The gas accounts are rendered three times annually—January, April, and October. Thus the ordinary consumer has the advantage of four and seven months' credit respectively; and as the meter indications necessarily have to be taken some considerable time before the end of the month concerned, it practically amounts to a credit of five and eight months respectively for a portion of the gas consumed. Compared with this, it will be borne in mind that the slot-meter consumer actually prepays for gas, which is an important consideration. At the end of the meter-indicating-period, the ordinary consumer has at least one month's credit; while the cash from the slot-meters is already in the bank.

Under present conditions, the convenience and comfort afforded to all classes of the community who desire the use of slot-meters are great. The fact that some undertakings do not supply slot-meters, cookers, and service-pipes free of charge does not, in the author's judgment, cancel this fact. To what extent a gas undertaking is justified in supplying free internal gas-fittings is an open question, and must depend largely upon local conditions.

All the slot-cookers supplied by the Huddersfield Corporation have a badge affixed attesting their ownership.

As regards the cost of collection, the idea universally prevalent is that it is enormously heavier in the case of slot-meters than with ordinary ones. In the author's opinion, this is a fallacy. It is quite true that if the monetary value alone is taken into account, then the cost may appear heavier. The cost of inspection and collection is certainly not heavier in the case of a consumer taking a million cubic feet than 1000 cubic feet. But to be strictly correct, the basis of comparison should be "per consumer;" and if this be considered, then it can be shown that the cost of a slot consumer for inspection and collection is not greater than for an ordinary consumer. It must be remembered to reckon "per consumer" and not "per 1000 feet of gas sold."

A little over ten years since, in the "JOURNAL OF GAS LIGHTING" (Dec. 20, 1898, p. 1420), a letter appeared from the author expressing his full satisfaction with the adoption of the slot-meter system; and after a further ten years' experience, he corroborates the same.

EFFECTS OF COMPRESSION ON CARBURETTED WATER GAS.

At the Annual Meeting of the Illinois Gas Association, a paper was submitted on the "Effects of Compression and Transmission on the Candle Power and Heat Units of Gas." It was in two parts. The first was by Messrs. H. E. Bates and J. R. Rafferty; and it was read by the latter. The following are some extracts from it.

The opening paragraphs were devoted to some general remarks on the composition of gas, which led the authors to the statement that the only constituents which were probably affected by the pressure used in their tests were the illuminants; and they said the reason for this might be emphasized by drawing the distinction between a gas and a vapour. Having determined in a broad way the probable composition which the illuminants approach, the authors proceeded to consider what factors affected them, so far as their tests were concerned. They then gave the following particulars in regard to the tests.

A 3 H.P. vertical engine ran a compressor by means of a belt. The compressor was connected by a short length of pipe to two 30-gallon galvanized iron tanks, in which the gas was compressed. The tanks were so connected that the pressure in each was the same at all times, and was indicated by a gauge. A thermometer on the tanks showed the temperature of the compressed gas, and cocks on the bottom of each tank provided means of removing any condensation that might be formed. A Williamson high-pressure governor on the outlet from the tanks regulated the pressure of the gas; and the latter was further regulated by passing it into a meter-prover. The outlet to this was connected by two branch pipes to a Junkers calorimeter and to a 110-inch bar photometer. The branch pipe to the calorimeter was also connected to a Morehead burette, so that a gas analysis could be made. The gas used in all the tests was carburetted water gas; and all tests were conducted in the following manner.

The candle power and the heating value of the normal gas were taken, and then the gas was compressed to the desired pressure, the inlet-valve closed, and the gas allowed to stand for about an hour, until it had cooled down to the room temperature. After standing for an hour, whatever condensation may have been formed was removed, and then the compressed gas passed through the Williamson governor into the meter-prover. Thence it passed at constant pressure into the branch pipes leading to the photometer and calorimeter.

Tests were made at three different pressures each day; and, as the normal gas during any one day was fairly constant, one complete analysis each day was made, and the carbon dioxide and illuminants determined in the gas after each compression. After testing the gas at any one pressure, and before compressing to a different pressure, the outlet and inlet valves were opened, and gas was pumped through the system. This purged the tanks and pipes of all gas and condensation which may have been left from the previous test, and thus prevented the new gas compressed from taking up any of the condensation, which would nullify the test. The piping was so arranged that the gas entered the storage-tanks near the bottom, and was drawn out at the top. By this arrangement, whatever condensation deposited, due to the compression of the gas, settled on the bottom, and could be withdrawn. This prevented the gas mechanically taking up the condensation again when the pressure was released.

Simultaneous readings of candle power and heat value of the gas were taken. A No. 7 Bray burner, of the slit-union type, was used, burning gas at the rate of 5 cubic feet per hour. It was intended to remove the condensation, and then obtain its vapour tension; but on subsequent removal of the condensation, the amount obtained was only a trace, which was too small to make any determinations. This was contrary to what we had expected; but the small quantity obtained was due, no doubt, to the size of the containing tanks; each one holding only 6½ feet of gas.

Gas of different candle powers was tested: One of 21, one of 22, and one of 24 candle power. The reason for taking such a course was to affirm or refute the idea, held by many experienced gas men, that the higher the candle power of the gas the larger the drop on compression. The following table gives the candle power and heat value drop for the different candle power gases:—

21-Candle Gas.			22-Candle Gas.			24-Candle Gas.		
Pressure. Pounds Per Sq. Inch.	Drop in C.-P.	Drop in B.Th.U.	Pressure. Pounds Per Sq. Inch.	Drop in C.-P.	Drop in B.Th.U.	Pressure. Pounds Per Sq. Inch.	Drop in C.-P.	Drop in B.Th.U.
5	0·58	7*	5	0·40	5	5	0·79	19
10	0·93	6	10	0·90	7	10	1·20	15
15	1·44	4	25	2·10	16	25	1·70	22
20	2·04	14	55	3·30	19	35	1·76	6
30	2·40	16	80	3·45	19	50	2·50	16
40	2·80	20	85	3·50	16	60	2·49	20
45	2·81	8	100	3·28	27	65	2·81	11
70	2·95	15	..	..	..	80	3·02	32
75	3·30	12	..	..	..	90	3·23	37
100	3·25	17	..	..	..	..	..	..

* In this one instance we obtained an increase in B.Th.U. when the gas was compressed.

The figures given in the next table indicate the percentage drop in candle power and heat value:—

21-Candle Gas.			22-Candle Gas.			24-Candle Gas.		
Pressure. Pounds Per Sq. Inch.	Drop in C.-P. Per Ct.	Drop in B.Th.U. Per Ct.	Pressure. Pounds Per Sq. Inch.	Drop in C.-P. Per Ct.	Drop in B.Th.U. Per Ct.	Pressure. Pounds Per Sq. Inch.	Drop in C.-P. Per Ct.	Drop in B.Th.U. Per Ct.
5	2·70	1·06*	5	1·80	0·73	5	3·30	2·63
10	4·43	0·89	10	4·05	1·01	10	5·11	2·14
15	6·86	0·59	25	9·62	2·35	25	7·06	3·08
20	9·50	2·09	55	14·90	2·80	35	7·43	0·85
30	11·23	2·34	80	15·60	2·81	50	10·60	2·28
40	13·30	3·05	85	15·60	3·31	60	10·50	2·82
45	13·50	1·19	100	15·24	3·92	65	11·70	1·54
70	14·10	2·25	..	..	..	80	12·57	4·42
75	15·60	1·77	..	..	..	90	13·63	5·20
100	15·50	2·53	..	..	..	..	..	..

* Increase.

The first table shows the variable results obtained in our heat-value tests. While the candle power decreased uniformly with the pressure, the heat value did not. By consulting the heat-value results given, we have a different state of affairs from that

which obtained when we considered our candle power data. Whereas the luminosity of the 24-candle gas experienced less drop than the 21-candle or the 22-candle gas, the conditions are reversed in considering the heat values. In other words, the loss in heat value was greatest with the gas of high candle power. The variability of these heat-value figures must limit the conclusions drawn to a very general character. They indicate that the condensation obtained at the same pressure for the three gases is not of the same character. At any rate, the condensate of the 24-candle gas possesses hydrocarbons which have a lower candle power and higher heat value than those found in the condensate of the 21-candle gas. If we assume that the 24-candle gas contains more complex hydrocarbons than the 21-candle gas—and we have good ground for the assumption—we can imagine why the heat-value drop was largest with gas of high candle power, for these complex illuminants have a very high heat value, and a low vapour tension. They are, therefore, easily condensable; and the gas that loses most of them suffers most in heat-value.

In conclusion, we may summarize the results obtained by compressing carburetted water gas:

1.—The candle power of carburetted water gas decreases as the pressure increases from 0 lb. to 100 lbs., temperature remaining constant.

2.—The loss in candle power due to compression of gas of high candle power is not so great as that obtained from compressing gas of low candle power.

3.—The loss in candle power due to the compression of water gas is greater between 5 lbs. and 60 lbs. pressure than between 60 lbs. and 100 lbs. pressure.

4.—The heating value of water gas decreases as the pressure increases from 0 lb. to 100 lbs., temperature remaining constant.

5.—The loss of heating value due to the compression of water gas is greater for gas of high candle power than for gas of low candle power.

FÉRY'S SPIRAL PYROMETER.

Some particulars are to hand of this new form of pyrometer, beyond those contained in the paper read last February by Mr. G. C. Pearson, of Birmingham, before the Midland Junior Gas Association, and reported in the "JOURNAL" at the time—see Vol. CV., p. 457-60. This modification of his well-known pyrometer has been designed by Professor Ch. Féry, of the Ecole Municipale de Physique et de Chemie Industrielle, Paris, in order to overcome some of the defects that have been found to exist when the instrument is employed for works' tests, as contrasted with laboratory use. One of the disadvantages referred to is the fact that a galvanometer has always to be used in conjunction with it, which necessitates a comparatively level spot on which to place the galvanometer, and the employment of leads to connect the pyrometer to the galvanometer.

Realizing this drawback, Professor Féry has produced an instrument which, while having practically all the advantages of the old one, does not require either a galvanometer or leads. The instrument is a complete unit in itself; and only those who have had to take the temperatures of a gas-retort with the older type can fully appreciate what this means.

The principle and construction of the new instrument are extremely simple. Instead of the heat rays being concentrated on a thermo-electric couple, as in the earlier form, they are focussed on a small bi-metallic strip made of two metals rolled into the form of a spiral, which unrolls when heated, owing to the largely different coefficients of expansion of the metals used.

Fig. 1 shows the spiral enlarged; its centre being fixed while its outer free end carries a light aluminium pointer, which, as the

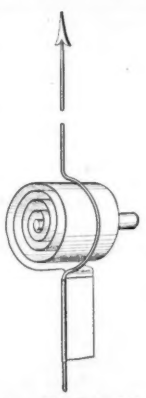


Fig. 1.—The Spiral (four times full size).

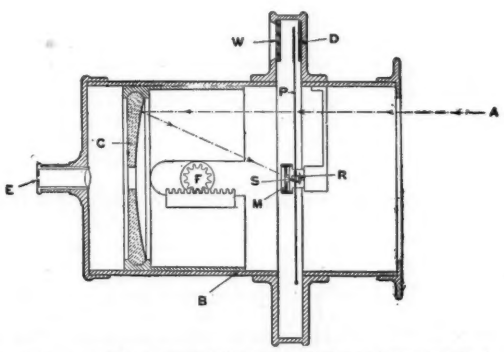


Fig. 2.—Section through the Pyrometer (one-third full size).

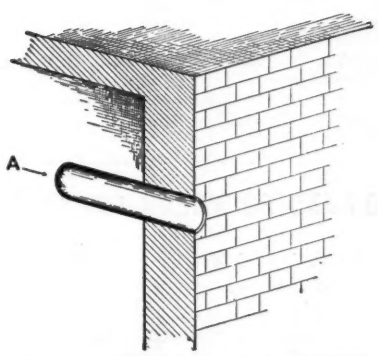


Fig. 5.—Showing Method of Testing Furnace.

spiral unfolds, moves in front of a scale calibrated in temperature. The spiral is very small—actually measuring less than one-eighth of an inch (3 mm.) in diameter, and 5-64ths of an inch (2 mm.) wide. It is blacked, so as to absorb as large a quantity of heat as possible. Any radiation passing through its convolutions is at once reflected back on to it by means of a small mirror (not shown) placed behind it.

Fig. 2 shows diagrammatically a sectional view through the instrument. A is one of the heat rays which, coming from the furnace or hot body, strike the concave mirror C, and are reflected to a focus on the small spiral S. The pointer P moves in front of the scale D; the observation being taken through the glass window W. A shutter (not shown) is provided in front of the instrument, to screen off all radiated heat until it is desired to take a reading.

In order to eliminate errors which may arise through changes in the actual temperature of the instrument, an adjustment is provided by which the centre rod supporting the spiral may be turned, and thus the needle set to the zero on the scale. It is important that this zero adjustment should be made immediately before taking any observation; the shutter in front of the pyrometer being closed while the setting adjustment is made by a small knob on the side of the instrument. On opening the shutter and exposing the instrument to the heat rays, the pointer rises rapidly to some point on the scale and then pauses. This point is the temperature of the hot body. It will be noticed, as the instrument as a whole gets hotter, that the pointer creeps up slowly; and if the pyrometer is left in position for a comparatively long while, a second zero reading must be taken and a correction applied for the new zero reading.

Extreme scientific precision is not claimed for this new instrument, but an accuracy of between 1 and 2 per cent. is said to be readily obtainable.

The table of results given by Mr. Pearson in the paper already referred to (see p. 460 of the "JOURNAL" for Feb. 16 last) showed the results of comparative tests between a standardized Féry

Fig. 3.—Front View of the Féry Spiral Pyrometer, Showing Scale and Pointer.

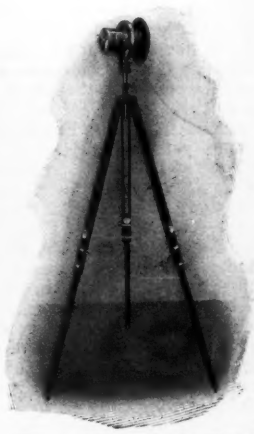


Fig. 4.—The Pyrometer Mounted on its Tripod.

thermo-electric radiation pyrometer and the new spiral type of instrument. The figures are of particular interest, as they were made by an observer who had practically no experience with the new instrument, and were taken in a retort-house in full operation. The two pyrometers were focussed on the same point in the retort, and the readings were taken simultaneously.

The instrument is portable, and is supplied with a light, rigid wooden tripod. Fig. 3 shows the front view of the pyrometer with the temperature scale and pointer. As at present constructed, the instrument is made with three different scales, which

will, it is believed, cover most commercial requirements. These scales are:

(1) 500° to 1100° C., which will cover practically all annealing, hardening, and case-hardening temperatures.
(2) 500° to 1400° C., covering practically all the temperatures met with in gas-works, the pottery trade, &c. It is, on the whole, the most generally useful range.
(3) 500° to 1700° C., covering any temperature in a steel-works.

In order to get true temperature readings with this and all types of radiation pyrometers, the condition which should be fulfilled is that the hot body sighted-on should be contained within a chamber the walls of which are at approximately the same temperature as itself. This condition is, of course, fulfilled in most practical cases—such as in taking the temperature of the inside of a gas-retort, fire-box, annealing, hardening, or muffle furnace, &c. The error caused by the fact of the furnace door being open when sighting is negligible—especially as the instrument is calibrated under these same conditions.

If it is desired to take observations without opening the door of the furnace or making any opening in the wall, the arrangement illustrated by fig. 5 may be adopted. A cast-iron or fire-clay tube is built into the furnace wall; the tube being closed at the end A, which is inside the furnace, and open at the other end. Since the tube takes up the temperature of the furnace for some distance along its length, it fulfils sufficiently closely the required conditions of a closed chamber with walls at the high temperature; and therefore by sighting on the blind end A, the true temperature is registered without allowing any cold air to find its way into the furnace, or any flame to come out.

In measuring the temperature of any body which is not inside a closed chamber with hot walls, the reading obtained will be lower than the true temperature of the body. The amount by which the reading will be low depends chiefly on the nature of the surface of the body itself. For instance, in the case of a block of carbon, it will be very small, since carbon is what is known as "black body;" while in the case of a crucible of copper with a clean surface, the reading will be perhaps 100° or more below the true temperature. Although no definite figures can be given for this apparent error (as it depends on local conditions), yet, if the conditions remain the same, the error will be a constant one; so that it may be determined once for all experimentally by measuring the temperature of the body first inside and then outside the furnace.

This new Féry spiral pyrometer is being constructed in this country by the Cambridge Scientific Instrument Company, of Cambridge.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

The Seventh Annual Meeting of the Association was held on Friday at the Cripplegate Institute, Golden Lane, E.C.—the President (Mr. W. J. Liberty) in the chair. The business of the evening was the adoption of the report and balance-sheet, and the election of officers for the ensuing year.

After the transaction of the formal business, the President gave a *résumé* of the past session. In the course of this he said that the membership was 123, representing 21 gas undertakings. The session had been remarkable for the amount of work accomplished, and the number of fresh features started. A Joint Meeting of the Junior Gas Associations was held in London last August. Several works were then visited; and a drive was taken through the most important parts of London. In the afternoon, there was a meeting at the Franco-British Exhibition, when the Association's patron, Mr. H. E. Jones, gave an address; while the Gaslight and Coke Company received the members at tea in the Gas Section of the Exhibition. At that meeting, a Joint Council was formed to meet annually and discuss how best to further the interests of the juniors throughout the country. A Joint Council meeting was held at Manchester in February, at which the Association was represented. It had been decided during the year to publish in a separate volume for the first time the "Transactions" of the Association; and it was hoped that the possession of such a record of the work done would be appreciated by the members—the payment of the current subscription entitling them to have a copy free. The Livesey Memorial Fund had been taken up by the members; and the sum of £4 4s., made up of individual subscriptions, had been forwarded to the Secretary of the Institution of Gas Engineers. The thanks of the Association were extended to the authors of papers and addresses, as well as to the Engineers and others who (on the occasions of the various visits) had so kindly entertained the members and given them so much valuable information. During February, a very successful Association dinner was held, which helped to bring the members into closer touch with each other. In conclusion, he remarked that the past year had been one of progress in the gas industry generally. Many were the changes taking place; and fortunate were the members who were in training in the profession during this time of transition and new development.

The result of the election of officers was as follows: Senior Vice-President—Mr. L. F. Tooth. Junior Vice-President—Mr. T. F. Canning. Council—Messrs. J. G. Clark, F. Ainsworth, D. J. Winslow, K. Sproxton, J. R. Gale, P. J. Smithers, E. Seears, and H. Rothwell. Mr. J. G. Clark having relinquished the Hon. Secretaryship after three years of office, Mr. S. A. Carpenter was elected in his place; while to the office of Hon. Treasurer vacated by Mr. Carpenter, Mr. J. Hewett was elected. Mr. E. Merry was re-elected Hon. Auditor. Owing to the resignation of Mr. W. A. Barnett as Senior Vice-President, Mr. W. J. Liberty was, on the recommendation of the Council, unanimously re-elected by the Association as President for the year ensuing.

The Association passed a special vote of thanks to Mr. Clark for his services as Hon. Secretary during the last three years; and a Sub-Committee was formed to give effect to the resolution in a concrete form. Mr. Carpenter and Mr. Merry were also thanked for carrying out the duties of Hon. Treasurer and Hon. Auditor respectively.

Association of Water Engineers.

The fourteenth annual general meeting of the Association will be held in Durham from the 10th to the 12th of June, under the presidency of Mr. Robert Askwith, M.Inst.C.E., the Engineer of the Weardale and Consett Water Company. According to the circular issued by the Secretary (Mr. Percy Griffith, M.Inst.C.E., F.G.S.), the business will be transacted in the Town Hall, and the proceedings will be opened with a welcome by the Mayor, Mr. J. F. Boyd, J.P. Papers on the following subjects have been promised:—

"Steam-Driven Pumping Plant for Deep Wells and Boreholes," by Mr. Alfred Towler.

"Working Results of Pumping-Engines Operated by Producer Gas," by Mr. D. Hastings Irwin.

"The Selby New Water-Works," by Mr. Percy Griffith and Mr. Bruce M'Gregor Gray.

"Public Water Supply for Fire Extinguishing," by Mr. C. W. S. Oldham, the Borough Water Engineer of Ipswich.

On the afternoon of the first day, a visit will be paid to the offices, workshops, meter-repairing, and fittings-testing departments of the Newcastle and Gateshead Water Company, which will be inspected under the personal guidance of Mr. A. L. Forster, M.Inst.C.E., and the President-Elect, after which tea and light refreshments will be provided by the Directors of the Company. In the evening, the annual dinner of the Association will be held at the Masonic Hall. Next day, there will be a visit to the Waskerley and Tunstall storage reservoirs of the Weardale and Consett Water Company. A description of the works, by the President-Elect, will be circulated among those who take part in the visit, which will occupy the entire day, and include a drive of twelve miles. A light luncheon will be provided by the Directors at Waskerley, and tea by Mr. and Mrs. Askwith at Tunstall. Ladies will be cordially welcomed at the opening of the proceedings, as well as at the visits to works.

We have received from Herr R. Oldenbourg, of Munich and Berlin, "Der Gasrohrleger und Gaseinrichter," by Herr Friedrich Kuckuk, Manager of the gas, water, and electricity works of the Heidelberg Municipality. It is the second edition of a work originally published in 1904; and the revised text contains 388 illustrations. The book will be noticed in an early issue.

At the recent meeting of the Iron and Steel Institute, Mr. J. Cruickshank Smith, B.Sc., submitted a report on the value of physical tests applied to protective coatings for iron and steel. He pointed out that the durability of these coatings depended as much upon physical as upon chemical laws; and he emphasized the importance of properly proportioning the pigment and vehicle, as also the fact that they should not be readily separable. New tests were described for determining the uniformity and thickness of the film, seldom more than 100th of an inch; also its strength, as determined in a breaking-machine known as the "Filmometer," and its hardness and permeability by vapours and gases.

"Practical Testing of Gas and Gas-Meters" is the title of a book lately published by John Wiley and Sons, of New York, of which we have received a copy through Messrs. Chapman and Hall, Limited. The author is Mr. C. H. Stone, B.S., M.S., the Chief Inspector of Gas (Public Service Commission) for the second district of New York; and we hope to notice his work fully in an early issue. Meanwhile, it may be mentioned that he says his chief aim has been to "explain clearly, simply, and fully such tests as would be of practical service to the gas manager, chemist, or photometrist, and to make such comments and suggestions as might guide him in his choice of apparatus or process, and assist him to secure accurate and useful results therewith."

The Chartered Institute of Secretaries have arranged examinations to test the qualifications of those who are desirous of becoming members. The President for the year is Mr. A. B. Pilling, the Clerk to the Metropolitan Water Board; and, when presiding at the annual dinner, held last Friday at the Holborn Restaurant, he referred to the examinations, and, as showing they are no pretence, he mentioned that 24 per cent. of the 222 candidates who presented themselves last year failed to pass. Some 150 candidates have signified their intention of going in for the examination next month—a fact which Mr. Pilling regarded as a striking proof of the growing popularity of the profession, and the success of the principles of articles of clerkship which were instituted some few years ago.

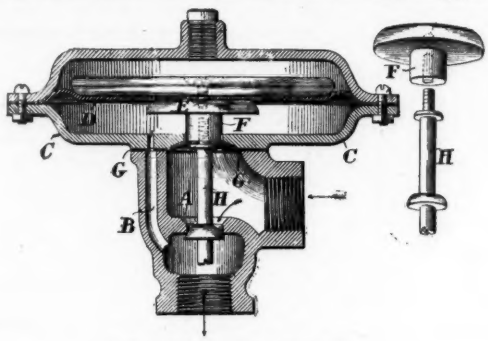
REGISTER OF PATENTS.

Pressure Regulators.

REYNOLDS, M. G., of Anderson, Indiana, U.S.A.

No. 5093; March 6, 1908.

To maintain a uniform pressure in service-pipes independent of the fluctuation of pressure in the main, the inventor provides a regulator embodying a controlling diaphragm in connection with a balancing diaphragm carried by a valve-stem extending from the controlling diaphragm to an intake valve from the main to the service-pipes.



Reynolds' Pressure Regulator.

The inlet and outlet connections are in communication with each other through the port A having a valve seat therein. This body is also provided with a passage B extending upward from the outlet and communicating with an opening through the bottom of the diaphragm case C. Between the top and bottom plates of the case the upper diaphragm D is secured. The top plate of the case has an apertured collar in which a threaded vent plug is secured, with an aperture extending through it. Above the diaphragm is a pressure plate with a threaded aperture E. The lower diaphragm plate is provided with a depending extension F, which is slidingly mounted in an aperture through the bottom of the diaphragm casing, and is connected with the balancing diaphragm G by the valve stem H. This stem is provided at its upper end with a threaded portion and a collar adapted to clamp the balancing diaphragm in contact with the extension F. The diaphragm is also provided with an aperture in alignment with the pressure passage B extending through the valve case to the diaphragm. The lower end of the valve stem H is provided with a valve, preferably of convex form, to engage the edge of the seat in the casing, and provided at its extended end with a slot by which it may be screwed into its connection with the lower diaphragm plate.

In operation, when a large volume of gas is passing through the valve the flow to the regulating diaphragm descends across the lower end of the passage B, producing a suction which reduces the pressure in the regulating diaphragm chamber and effects a higher pressure at the outlet of the regulator. This pressure increases when a large volume is being used, and overcomes the friction in any connected meter to the house piping—thus giving a more uniform pressure at all times to the burner. In order to prevent the increase of pressure pushing the valve open and affecting the low pressure in the service-pipe, the valve is balanced by the diaphragm G connected to the stem H of the valve and the extension F, the lower face of which is of the same area as the gas-orifice A, so that the inlet pressure on the diaphragm will be the same as that exerted upon the valve to open it—thus effecting an equalization of pressure through the regulating diaphragm. In order to prevent gas passing upward around the valve stem and into the upper diaphragm chamber, the balancing diaphragm is used, and the shouldered valve-stem provides means for effectually connecting the diaphragm with the regulating diaphragm. The upper and lower diaphragms are therefore connected together, and with the valve; while the upper diaphragm is in communication with the low-pressure side of the valve, so that an excess of pressure upon this side can force upward the regulating diaphragm and close the valve. Under other conditions, the valve is regulated automatically in its movement, so as to produce a uniform pressure in the house service and protect it from fluctuations in the street main.

Grids for Gas-Purifiers.

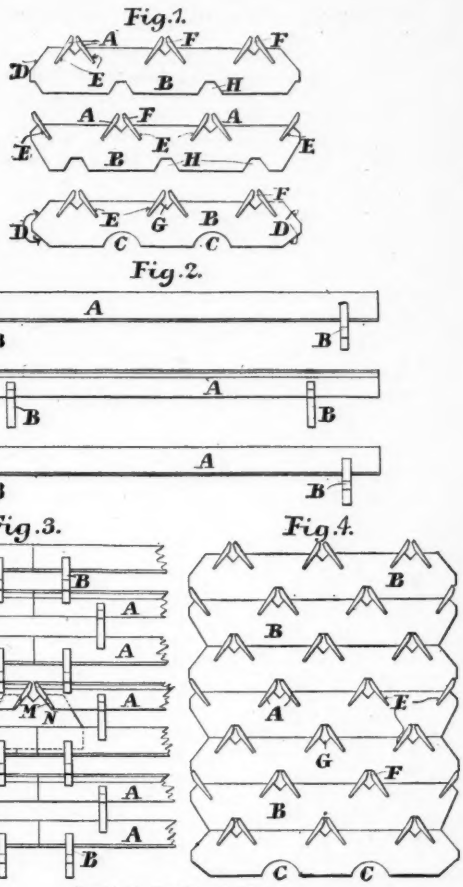
DURKIN, F., of Southampton.

No. 13,656; June 27, 1908.

Grids for gas-purifiers according to this invention comprise a number of wood laths arranged in pairs to form hollow ridges, connected by cross members; the wood laths of each pair diverging outwardly in a downward direction. Several grids, composed, it may be, of a number of sections, are disposed one above another in tiers, and the cross members of the grids above the lowermost grid are recessed to fit on to the ridges of the grids beneath; while the ridges of the several superposed grid sections are so arranged as to lie in vertical planes intermediate of those of the next grid sections above or below them.

Figs. 1 and 2 show (elevations at right angles to each other) constructions of grid sections according to this invention. Figs. 3 and 4 are similar views of a portion of a grid formed of sections, as in figs. 1 and 2, arranged one above another in tiers.

Each section comprises a number of wood laths A in pairs, and cross members B connecting them. The cross members of the lowermost sections that rest on the ordinary form of purifier grid (not shown) are formed with recesses C—say, two at equal distances from their end, which are preferably chamfered at D from above and below to prevent



Durkin's Purifier Grids.

gas slipping without proper contact with the purifying material through any space between the juxtaposed ends of the cross members of grids of the same tier. In the upper edges of the cross members of the grid pairs of outwardly diverging slots E are cut intermediate of the recesses and chamfered ends. Into these slots the laths A are inserted—being of such width that they project above the cross members but do not meet.

The laths are of weather-board section; and the thin edges enter the slots E, while the upper edges are so shaped as to form passages F with inclined sides between the laths of each ridge. Between each pair of slots angular notches G may be formed in the cross members, giving a continuous connection under each line of ridges.

The cross members of the middle grid section are formed with recesses H corresponding in shape and position with projecting portions of the lath-formed ridges of the grid section below, and with the pairs of slots E in their upper edges intermediate of the recesses. At the ends of the cross members there may be single slots, as shown in fig. 1, which receive one lath; the other lath being inserted in a corresponding slot in the cross members of an adjacent section.

The next grid section is formed with recesses H in the lower edges of its cross members corresponding as to shape and position with the ridges of the grid section below it; but its ridges are disposed in positions corresponding to those of the ridges of the lowermost grid section.

Single pairs of laths M (fig. 3), forming ridges connected by cross members N, may be arranged to extend at right angles to the laths A, between the sections of alternate tiers—such additional ridge structure resting on the cross members B of the tier below.

With such grids, it is claimed that purifiers can be easily charged with a much larger quantity of purifying material in a loose condition than when using ordinary grids, and present a large surface to the gas with about the usual back-pressure; and no special care is necessary in filling to prevent the slipping of gas through the purifier without being properly acted upon by the purifying material though a comparatively free passage for the gas is afforded.

Hot-Plates for Gas Cooking-Stoves.

MAY, W., of East Ham, Essex.

No. 15,412; July 21, 1908.

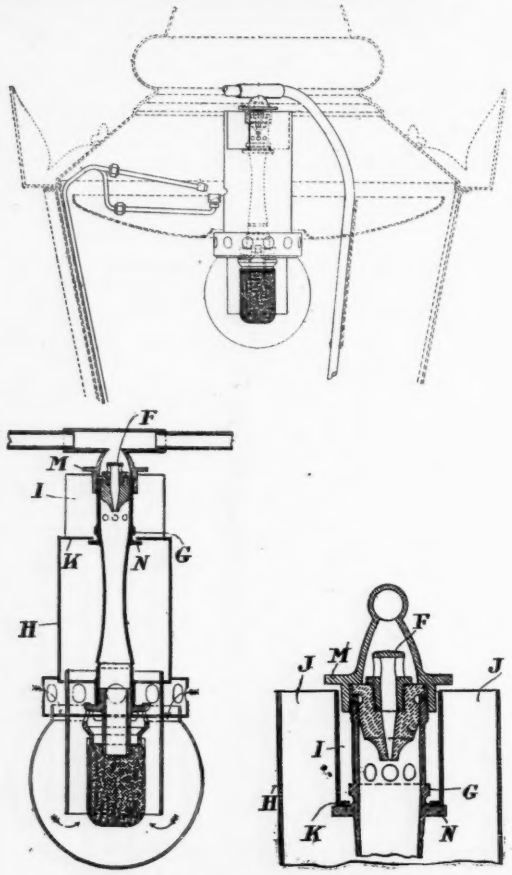
This invention consists of a radiator or receiver (into which the heat from the gas-jet draws), of shallow tray-form, having an enclosed top and with an opening in the bottom at one end or corner sufficiently large to encircle the gas jet or ring. In the top of the receiver a second opening is formed, immediately over the opening in the bottom. In this manner, the heat enters the receiver at the bottom and strikes immediately on the bottom of any vessel which may be placed over the opening at the top of the radiator. The heat which would otherwise become lost is thus enclosed within the radiator, and is carried to the bottom of a second or third vessel, which may be placed over a similar opening to the first one on the top of the radiator. Suitable legs at the corners of the radiator support it when used for the circular gas-rings.

Inverted Incandescent Street-Lighting Burners.

CARPENTER, C. C., of Old Kent Road, S.E.

No. 18,248; Aug. 31, 1908.

This invention has reference to means by which incandescent gas-burners of the inverted type may be adapted for use in lamps for street lighting; the object being "to provide a burner which can be readily lighted and extinguished, and can at the same time be easily detached and taken to pieces for cleaning and inspection."



Carpenter's Inverted Burner for Street Lamps.

The burner is shown in elevation, and sectional elevation, and also an enlarged section of the head of the burner.

Into the top of the burner-tube a loose nipple fits resting by a flange and held in position and made gas tight by the shoulder of the T-piece into which the burner-tube is screwed, and which T-piece serves as a channel for the gas. The nipple is provided with a baffle F, to prevent dust or other obstructions falling in. On the upper part of the burner-tube an octagonal projection G is provided for a purpose to be presently described. The burner-tube is surrounded by a cylindrical outer casing or chimney H having a walled recess I at the top between side openings J, and provided with a plate or floor K, which has cut in it an octagonal opening through which the upper part of the burner-tube can be passed. The T-piece supplying the gas to the burner has provided on its lower edge a flange M.

The height of the walls of the recess of the outer casing is so arranged that when the casing is pushed upwards against the flange of the T-piece the octagonal projection G on the burner-tube fits into the octagonal opening in the floor K of the walled recess of the outer casing; and while in this position it is locked. By this means, if the lower part of the casing is held, it may be used as a box spanner to screw and tighten the burner-tube into the T-piece and make a gas-tight joint. When the burner-tube is thus secured, the casing is supported by resting upon the flange N formed upon the burner-tube a little below the octagonal projection G.

For lighting the burner, a continuous burning pilot-light is arranged external to the casing; and the arrangements for actuating the main and flashing supplies are similar to those described in patent No. 20,341 of 1900.

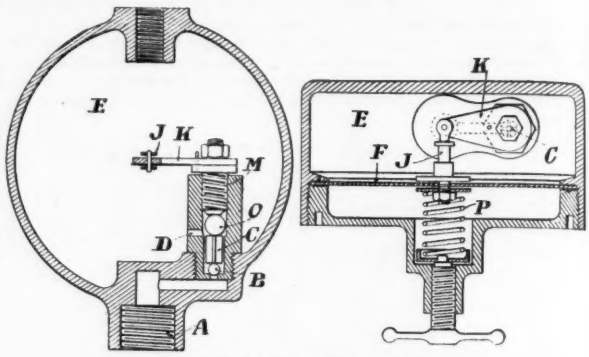
Gas-Regulating Device.

GAUDET, A., of Paris.

No. 19,678; Sept. 18, 1908. Date claimed under International Convention, Oct. 8, 1907.

This invention relates to an improved pressure-regulating device comprising a ball-valve operated not directly by a diaphragm, but the latter adjusts the ball-valve towards or from its seat through the intermediary of gear comprising a lever and screw adjustment.

The gas under pressure is introduced through at A and comes under the ball B, which it raises. The gas then passes around the metal support C (of cruciform shape) and, passing through the opening D, enters the expansion chamber E, where it exercises pressure on the diaphragm F. The diaphragm, being put under tension by the pressure of the gas, forces the rod J to follow it in its new position. The lever-arm K, connected with the rod by a pin, causes the screw M to turn, and in descending to exercise pressure on the ball O, which, through the medium of the support C, presses the ball B on to its seat, and prevents any subsequent introduction of gas.



Gaudet's Gas-Regulating Device.

The gas having expanded and escaped from the chamber E, the spring P acts on the diaphragm and returns it to its first position, whereby the screw M is caused to turn in the contrary direction through the medium of the rod J and lever-arm K. The screw having been raised again, the ball P can be raised once more and allow a fresh entry of gas. The ball O, which acts as an intermediary between the piece C and the screw M, is chiefly intended to prevent the screw from being wedged on the cross-shaped piece, and thus to make the movement as smooth in the one direction as in the other.

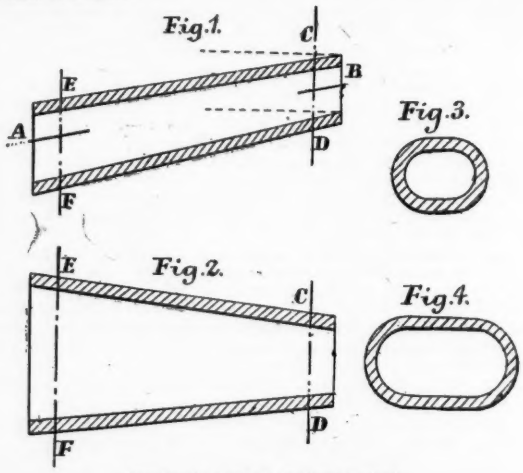
Gas-Retorts.

GENNOTTE, E., of Brussels.

No. 21,489; Oct. 10, 1908.

This invention relates to conical inclined retorts, the vertical section of which increases progressively towards the bottom—the roof of the retort being substantially parallel with the natural batter of the coal.

It is claimed that, *inter alia*, this method of constructing a retort presents the following advantages: The discharging is facilitated, owing to the greater conicity and inclination of the bottom of the retort; the discharging requires less effort on the part of the workmen; and the wear of the retort is less. Owing to the ease with which the furnace can be discharged, a larger charge may be placed in the retort; so that the number of chargings for treating a given quantity of coal is smaller than in the case of retorts heretofore constructed. The advantages which, it is said, follow from those enumerated above are a large reduction of labour, economy in the plant and fuel, while the retort is cooled to a smaller extent.



Gennotte's Conical Inclined Retorts.

Fig. 1 is a longitudinal vertical section. Fig. 2 is a horizontal section on the line A—B of fig. 1. Figs. 3 and 4 are vertical cross sections on the lines C—D and E—F respectively.

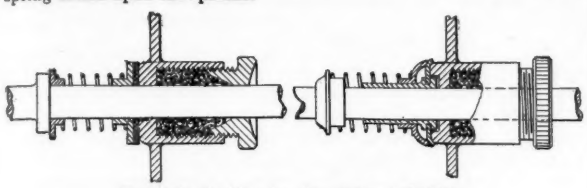
The section of the retort increases progressively, as is shown particularly in figs. 3 and 4. The roof is inclined to the horizontal by an angle which is substantially equal to the natural batter of the coal. The bottom, on the other hand, is inclined at an angle which is greater than the natural batter. In these conditions, "the coal, while encountering an increasingly greater section in its descent, preserves its surface approximately parallel with the roof in such a manner that there is no difficulty in providing a space all along the roof which is not filled with coal and towards which the gases naturally move." The sides might be parallel one with the other; but it is generally better, the patentee points out, to incline them so that the interval between them increases towards the bottom, as represented in fig. 2.

Packing the Spindles of Gas-Meters.

METROPOLITAN GAS-METERS, LIMITED, and FORSTER, J. D., of Nottingham.

No. 23,531; Nov. 3, 1908.

The patentees remark that it has hitherto been the practice to pack spindles used in connection with gas-meters by means of stuffing-boxes; and it has been found that the grease contained in the stuffing-boxes is liable to be attacked by the solvent constituents of the gas flowing through the meter, so that the joints around the spindles become leaky. To obviate this difficulty, they propose to pack the inner end of the spindle within the meter-casing by means of a disc or washer mounted upon the spindle and held against the inner end of the stuffing-box by a spring coiled upon the spindle.



Forster's Packing for Gas-Meter Spindles.

In the first arrangement shown for carrying out the invention, the spindle passes through a stuffing-box fitted in the meter-casing in the usual way, and within the meter is mounted upon the spindle a packing, disc of leather, maintained in close contact with the inner end of the stuffing-box by means of a spring coiled around the spindle. It bears at one end against a stop, and at the other end against a metal disc bearing against the back of the leather packing. This gas which passes through the meter is thus prevented from coming into contact with the grease in the stuffing-box, so that the disadvantage mentioned above is entirely obviated.

The alternative-method shown differs from that described above, in that the packing-disc is fixed upon the end of a sleeve rigidly secured to the spindle. Upon this sleeve there is mounted a metal disc which is applied against the back of the packing-disc under the action of a spring in the manner already described.

APPLICATIONS FOR LETTERS PATENT.

10,979.—LINES, H. G., "Incandescent burners and globes." May 10.
10,984.—CHARLTON, G., "Gauges for indicating the pressure of fluids." May 10.
11,013.—BEDELL, B. H., and HIRD, M., "Preventing taps from being turned fully off or alternatively fully on." May 10.
11,040.—HARLÉ, J. B. V. L., "Incandescent burners." May 10.
11,058.—WRIGHT, J. C., "Grid for gas purification." May 10.
11,059.—WRIGHT, J. C., "Hydraulic gas-mains." May 10.
11,063.—ST. JOHN, G. C., "Gas-meters." May 10.
11,105.—GOODING, W., and MEEK, J., "Bye-pass gas-fittings." May 11.
11,133.—PEGLER, B. C. H., "Regulating gas." May 11.
11,142.—DENNIS, F. H., "Acetylene generators." May 11.
11,143.—HEDGES, K. W., "Gas heating-stoves." May 11.
11,159.—RICHARDS, R. S., "Carbonization and distillation of fuel." May 11.
11,167.—HARLÉ, J. B. V. L., "Burners." May 11.
11,187.—DARLING, C. R., "Temperature measuring apparatus." May 11.
11,200.—EVANS, C., "Utilizing heat in stoves." May 12.
11,218.—FIELDING, J., "Gas-producers." May 12.
11,254.—TRACHSLER, H., and ERNST, F., "Producer gas." May 12.
11,257.—WALKER, A. B., and DONALDSON, J. H., "Street-lamps." May 12.
11,265.—GOBBE, E., "Gas-producers." May 12.
11,307.—DRAYSON, W. B. H., and J. TYLOR AND SONS, LTD., "Liquid meters." May 13.
11,315.—FISK, J. W., "Mantles." May 13.
11,332.—HANNAN, J., "Manufacture of oxygen and hydrogen or other gases." May 13.
11,345.—ELLIS, T. M., "Gas-economizers." May 13.
11,352.—AKERS, A. E. & C. W., "Globe-holders." May 13.
11,370.—POTZKAJ, P., "Inverted lamps." May 13.
11,371.—NÄSSÉN, J. F., and BERGSTRÖM, A. E. T., "Lighting and extinguishing gas-lights from a distance." May 13.
11,442.—GEWERKSCHAFT DER STEINKOHLENZECHE "MONT-CENIS," "Ammonium sulphate from distillation gases." May 14.
11,466.—BROUGHAM, Hon. R. T. D., "Regulating the pressure of gas." May 14.
11,469.—PÖSCHL, A., "Illuminating device." May 14.
11,513.—SOLON, M. F., "Regenerative burners and stoves." May 15.
11,527.—CROSSLEY, K. I., and RIGBY, T., "Gas-producers." May 15.

Spalding Water Supply.—A Local Government Board inquiry into the application of the Spalding Urban District Council to borrow £5000 for water-works improvements was recently held by Major J. Stewart, R.E. The proposal of the Council is to lay new 12-inch mains to Bourne, whence the supply is drawn, as the present mains are in a very bad condition, and the quantity of water obtained is insufficient. The estimated cost of the work is nearly £8000; but the Council already have unexhausted borrowing powers of £3000, and hence the present application for power to raise an additional £5000. It was anticipated that with the new mains not only would the supply of water be greatly increased, but that the present discoloration, caused by the old iron pipes, would be avoided, and the water be received in the state of purity in which it was obtained at Bourne. It was also calculated that the present heavy cost incurred in pumping operations would be saved. There was no opposition to the application.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Local Government Board Audits and the South Metropolitan Gas Company.

SIR,—We notice in your last issue a letter from Messrs. Dinwiddy and Sons, in which they refer to our recent objections before the Local Government Board Auditors to certain payments made to them by various rating authorities in connection with our last rating appeals. The firm in question, while sending you the report of the Local Government Board Auditor at Bermondsey, omit to send you the report of his colleague at Woolwich, which affords ample justification for the course we felt compelled to adopt in protection of the interests of ourselves and other ratepayers. Messrs. Dinwiddy and Sons will doubtless remedy this omission in your next issue, as without it they will not, in our opinion, have placed the entire facts "fairly and without prejudice" before your readers.

CHARLES CARPENTER,
Chairman, South Metropolitan Gas Company.

709, *Old Kent Road, S.E., May* 22, 1909.

The Relative Cost of Gas and Electricity.

SIR,—In reply to your remarks in "Electricity Supply Memoranda" for the 11th inst., the pleasure you evince in our previous controversies, is, I assure you, reciprocated; for anyone taking up the question of comparative costs with you may be certain of straight and unvarnished, if biassed, talk on the matter.

With regard to the names and addresses for which you ask, I regret I must place you in the same category as Mr. Clark.

In reply to your questions: (1) Do I believe that the householders quoted are obtaining a better light from electricity than from gas?—I not only believe it; I know it. (2) Do I believe they obtain with gas only 2·16 candles per cubic foot?—No, I do not; I believe the candle power obtained under the best conditions would be very much higher. But you have forgotten, in your calculations, to make allowance for the saving (one of many) effected by switching-off electric light immediately it is not required—a factor for economy which is no small one in private-house lighting. (3) Incandescent gas-burners were exclusively used. (4) As far as the consumers themselves can tell me, the lighting hours were approximately the same. (5) In those cases where gas-cookers were used, due allowance in the published figures has been made for the gas consumed by the cookers during the time electric light was used; the allowance being made according to the meter readings. (6) No gas, in any one case, is now used for lighting purposes.

For your satisfaction, I would say that, given the best conditions for gas, electric lighting by means of Osram lamps at West Ham rates is, candle power for candle power, about equal. But, and this is the *crux* of the whole matter, best conditions for gas are very rarely obtained in practice. In fact, I contend that the best results from gas lighting are unobtainable unless a gas-lighting expert is resident in each house. How often is the gas and air supply of burners properly adjusted for economical lighting? How often is the mantle properly placed on the burner? How often is the whole apparatus kept clean? How often, for the sake of appearance, is the light wasted in unsuitable shades (a very common fault indeed with gas lighting)? How often, for safety's sake, is the light placed in the worst possible position in regard to the spot where the light is needed?

The above are a few of the conditions which adversely affect the cost of gas lighting. By using electricity, however, the light can be placed in the best possible position; we see that suitable shades are used; and the candle power given depends on the lamp manufacturer and the current suppliers only, and not on the attention given to the lamps by the consumer.

In further evidence of the extremely low cost of electric lighting, I enclose a leaflet which we were obliged to issue, to counteract a growing impression. This leaflet is not an advertising dodge, but is a necessary contradiction of reports spread by persons who have changed from gas to electricity.

In conclusion, permit me to compliment the gentleman who writes "Electricity Supply Memoranda" on the tenacity with which he holds on to the idea that gas is unapproachable for any purpose. I would that the electric supply business possessed but a few of his sort; for the fight for custom with gas would then be a considerably hotter one, and to the advantage of electricity, than it now is.

H. H. HOLMES, Sales Manager,
West Ham Corporation Electricity Department.

Stratford, E., May 17, 1909.

[ENCLOSURE.]

A REPORT WITHOUT ONE ATOM OF TRUTH IN IT.

It has come to our knowledge that a report is being busily circulated throughout the borough, to the effect that, owing to the smallness of the amounts now being paid by many customers for electric lighting (due to the economy of metal filament lamps as compared with the cost of other methods of illumination), it will be found necessary in the near future to increase the present charge of 3d. per unit for current. A report of this character could have been ignored but for the fact that a number of prospective consumers have been thereby actually deterred from installing the electric light. We desire, therefore, to give the widest possible publicity to the fact that, in this or any similar reports, there is not one atom of truth; and at the same time to express our thanks to those of our customers who kindly brought this matter to our attention.

SIR,—May I be allowed, although an interested party, to make some comments on the controversy as to relative cost of gas and electricity, referred to in your issue of the 11th inst.?

No doubt, gas companies will from now on have to contend with more serious competition from electric light suppliers, owing to the introduction of the metallic filament lamps.

No one in his senses is likely to raise the question of comparative

cost of gas and electricity based on candle-power-hours—at any rate, until some more satisfactory invention than at present exists is put forward by our electrical friends.

Advocates of electric light claim economy by reason of (1) Convenience of control, thereby reducing waste of current to a minimum. (2) Smaller units of light; 8-candle power lights being often used.

Owing to the idea that electric light is expensive, the consumer is always careful to switch off his current when not in actual use; and the human element herein indicated is of more effect in keeping down electric lighting cost than is often admitted.

If gas companies, therefore, wish to unquestionably place their position of superiority before the public, they should of necessity do two things: (1) Offer the same convenience of control to gas lighting as electric lighting has. (2) Offer burners giving smaller units of light.

It appears to me, however, the main question resolves itself into satisfying a consumer of light that he is only getting the exact amount of illumination for his purposes, for the time he requires it, and no more.

The introduction of the two features referred to, would enable a consumer to satisfy himself that he was able to organize his lighting by gas on this basis; and the cost, I contend, would be always in favour of gas. But while these facilities do not obtain, I think that our electrical friends are perfectly justified in claiming the right to compare the amount of gas actually used for lighting, whether necessarily or wastefully, against the actual consumption of electric current, and not on the candle-power-hour basis, as is usually insisted on by those interested in the sale of gas.

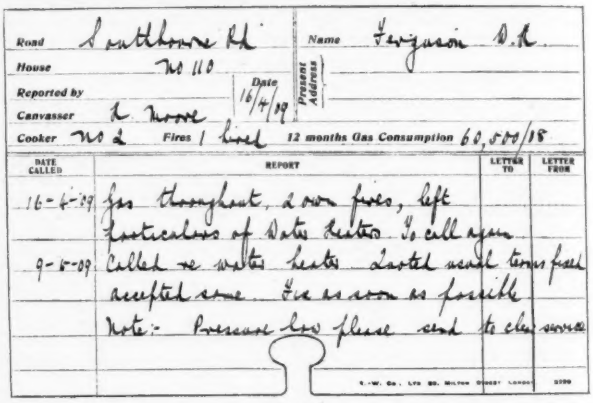
A. St. J. Cooke.

3, *Wynnstay Gardens, Kensington, W.*,
May 18, 1909.

[We have to thank Mr. Holmes for his courteous and complimentary remarks. In regard, however, to the portion of his letter dealing with the questions put to him, if the replies are the best and most convincing that he can make, it is really hardly worth while commenting upon them, but simply leave them to the judgment of readers. But we do not want to lose hold of Mr. Holmes just yet, as it would be interesting, if he will give the opportunity, to prove the value of his figures a little more. We cannot fathom—if the figures are true as quoted in our "Correspondence" columns on May 4, and referred to in "Electric Supply Memoranda" on May 11—his reasons for declining to give the names and addresses for which we asked. Our inquiries would be honestly made; and we fail to see, if the consumers are making the saving suggested, that any harm could come, but rather benefit should ensue, to the West Ham Electricity Department from divulging the information asked for. The results of the investigations would be very faithfully recorded in our columns. But briefly to his inconclusive replies. The answer to the first question shows our correspondent to be a man of decided opinions; but he does not explain the grounds on which he not only believes, but *knows*, that the consumers are now getting a better light than formerly. We shall be pleased to hear the grounds for such positive assertion. The answer to the second question is perhaps the most interesting of all. The equivalent for gas (in one case) of the illuminating performance of electricity, used under the best conditions, and keeping the house in darkness during the hours of artificial lighting excepting where the light is actually being usefully employed, is 2·16 candles per cubic foot formerly consumed; and Mr. Holmes believes that a "very much higher candle power" than this can be obtained for gas under the best conditions. Very well, he admits the potentiality of gas for giving the consumer a "very much higher illumination" than is possible by electricity at a far cheaper price, if the consumer will only go to the trouble of turning a tap and striking a match when the gas is required, and turning a tap again when it is not required—in place of the switching on and off of the electric current, If people are lazy, and are prepared to penalize themselves for their laziness, and will not have a higher illuminating power and a more economical light, then there is nothing more to be said. We cannot, however, understand householders who are so careful about switching on and off electricity to save the expense of illumination by this means, not being prepared to go to a little further trouble to secure a much greater meed in economy. There are on the market several effective switching arrangements for the lighting and extinguishing of gas (one of them providing electrical ignition without bye-passes) that can be installed, and paid for quickly out of the savings to be derived by properly using gas instead of electricity. We come to this as the sum and substance of Mr. Holmes's acknowledgments, that it is only by unbridled wastefulness in the matter of gas lighting, and by a rigorous control and studied economy of illumination in the case of electricity, that the lower accounts for the latter are obtained. The third answer tells us that incandescent burners were exclusively used in the cases quoted by Mr. Holmes; and lower down that cooking-stoves were also simultaneously employed. Only by the recollection of consumers, can Mr. Holmes say that the lighting hours were approximately the same during the relative periods referred to for gas and electricity; but the extent of lighting the houses was manifestly not the same, in view of the reply to the second question. The answer made to No. 5 question is interesting: "Due allowance was made in the published figures for gas consumed by the cookers *during the time electric light was used*; the allowance being made according to the gas-meter readings." The reading of this would suggest the deductions were made from the electricity accounts and not from the former gas accounts. We should like to have the opportunity of making a check investigation. It is feared that the registration of gas for cooking, heating, and lighting through one meter, and the account being rendered in the total, give to electricians a peg upon which to hang their arguments when dealing with householders. On the whole, there seems to be a fair amount of guesswork in the foundation of Mr. Holmes's postulatory statements. Our correspondent will make a much better impression if, instead of writing round about the questions in this way, he will furnish the names and addresses of the consumers whose figures he quoted, so that independent inquiries may be made. We suggest to the West Ham Gas Company that they append a statement to the next accounts sent out to the effect that, in view of the assertion of the Sales Manager of the West Ham Corporation Electricity Department, that many gas consumers are not getting from their incandescent burners their possible lighting efficiency, the Company are prepared to give advice free to any consumers who are of opinion they are not doing so, on hearing from them. The letter of our second correspondent—Mr. A. St. J. Cooke—is also welcomed. The Gaslight and Coke Company will, we know, be very pleased to show him the switching-off arrangements that are now, where required, applied to gas; and they can also show him pretty bijou burners consuming about 1 cubic foot of gas an hour, and giving a light of 20 candles, with a remarkably low mantle use and no renewal of the burners for years. With metallic filament lamps, the whole article has to be periodically renewed; with incandescent gas-burners, only the "filaments."—Ed. J.G.L.]

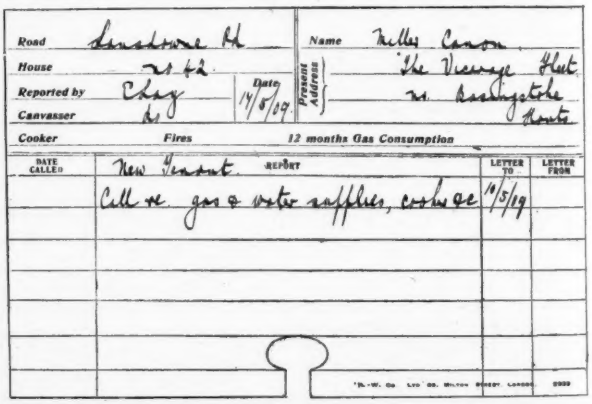
Gas Companies' Canvassers and the Card System.

Sir,—Herewith I have pleasure in enclosing copy of a card, the use of which my Company are finding most valuable.



Road Southmore Rd — Name Ferguson D.R.
House No 110 — Present Address
Reported by — Date 16/4/09
Canvasser L Moore
Cooker No 2 — Fires 1 lined — 12 months Gas Consumption 60,500/18

DATE CALLED	REPORT	LETTER TO	LETTER FROM
16-4-09	gas throughout, 2 own fires, left particulars of Date Letter to call upon		
9-5-09	Called re water heater Landl would times fuel accepted some fire as soon as possible Note:- Pressure low please send to clean over		



Road Southmore Rd — Name Miller Canon
House No 42 — Present Address The Vicarage Flat no Basingstoke Route
Reported by Clay — Date 14/5/09
Canvasser L
Cooker — Fires — 12 months Gas Consumption

DATE CALLED	New Tenant REPORT	LETTER TO	LETTER FROM
	Call re gas & water raffles, cookers &c	14/5/09	

Some time ago I felt that we had not a proper grip over the work of our canvassers; and I was not at all satisfied that we were obtaining the fullest value from their work. Everyone who has controlled canvassers knows that work is seldom obtained from the first visit, as consumers require a considerable amount of time to make up their mind with regard to a new departure. A timely reminder is very valuable; and it was for this that a card was instituted.

A certain number of cards are issued to each of our ordinary canvassers every day. On these cards, we enter all the particulars that we have of the gas appliances in use on the premises to which the card applies. The canvasser makes his call; enters the result of that call; and confirms the appliances in use. If there does not appear to be any reason for a further call in the immediate future, the cards are filed under the names of the road to which they apply. If it appears that another call is desirable, the cards are filed away in a calendar file, under the date on which the fresh visit is to be made.

We are finding the cards of the greatest possible value; and I send you these particulars as I think they are likely to be of interest and service to your readers.

H. W. Woodall, General Manager,
Bournemouth Gas and Water Company.

May 20, 1909.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Aldershot Gas and Water Bill, Ammanford Gas Bill, Yorktown and Blackwater Gas (Electric Lighting, &c.) Bill.

Bills read a second time: Gas Orders Confirmation Bills (Nos. 1 and 2), Gas and Water Orders Confirmation Bill.

Bills reported, with amendments: Eastbourne Gas Bill, Lisburn Urban District Council Bill.

Bills read the third time and passed: Alliance and Dublin Consumers' Gas Bill, Conway Gas Bill, Leyland and Farington Gas Bill, Littlehampton Gas Bill, Pontypool Gas and Water Bill, South Staffordshire Water Bill, Wakefield Corporation Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Alliance and Dublin Consumers' Gas Bill, Pontypool Gas and Water Bill, South Staffordshire Water Bill, Wakefield Corporation Bill.

Bill read the first time, and ordered for second reading: Musselburgh Gas Order Confirmation Bill.

Lords Bills read a second time and committed: Bungay Water Bill, Frimley and Farnborough District Water Bill, Grantham Water Bill, Worksop Water Bill.

Bills reported, with amendments: Clevedon Water Bill [Lords], Grantham Water Bill [Lords], Harrogate Gas Bill, Oldham Corporation Bill, South Lincolnshire Water Bill [Lords], Watford Urban District Council Bill.

Bills read the third time and passed: Aldershot Gas and Water Bill, Ammanford Gas Bill, Donington Water Bill [Lords], Harrogate Gas Bill, Heckmondwike and Liversedge Gas Bill [Lords], Pontypridd Water Bill, Wells Gas Bill [Lords].

On Monday, the 17 inst., the Gaslight and Coke Company Bill came up for third reading; but Mr. W. Thorne again formally objected, and the Bill was put down for the following Thursday "by order." However, on the motion of the Deputy-Chairman of Committees (Mr. Caldwell) it was then postponed till Thursday, the 3rd prox., when the House will resume after the Whitsuntide recess.

On the second reading of the Gas Provisional Orders Bill, the Committee of Selection were instructed to refer to the Local Legislation Committee a part of the Bill relating to the Prestatyn Gas Order.

On the motion of Mr. Stanier, the Committee on the Frimley and Farnborough District Water Bill were instructed "to inquire into and report whether it would be practicable and reasonable to impose obligations upon the promoters to supply water by measure for agricultural purposes within their limits of supply; and, if so, under what conditions persons should be entitled to demand and receive such supply."

LEGAL INTELLIGENCE.

ASSESSMENT OF THE PETERBOROUGH GAS-WORKS.

Peterborough Quarter Sessions.—Friday, May 14.

(*Before Lieut.-Col.* E. P. MONCKTON, *Chairman*, *Mr.* J. H. BEEBY, *Mr.* G. H. DEAN, *Mr.* J. A. HERBERT, *Mr.* T. C. LAMPLUGH, *and Alderman* J. B. TEBBUTT, *the Mayor*.)

An appeal by the Peterborough Gas Company against the assessment of their works was opened last Friday week. The amount in dispute is £1675; the Assessment Committee fixing the rateable value of the property at £4360, and the Company claiming that it should be only £2685.

Mr. W. C. RYDE and Mr. N. NICKALLS (instructed by Mr. W. B. Buckle) appeared for the Company; Mr. H. ST. JOHN D. RAIKES and Mr. H. L. WARD (instructed by Mr. H. B. Hartley) represented the Committee.

The Case for the Company.

Mr. RYDE, in opening, said the appeal was against the rate made on Nov. 4, 1908, and against that part of the Company's undertaking which was contained in the parish of Peterborough Within. The gross value of the undertaking was £7000, and the rateable value, as fixed by the Assessment Committee, was in the first instance £4500; but it was found that a mistake had been made with regard to some premises which had been inadvertently included, and the figure was reduced to £4360, against which the Company were appealing. The alteration from £4500 to £4360 made on the 17th of February last was a correcting of accounts rather than a lowering of assessment. The whole undertaking now stood in the various rate books for the different parishes at £4899, which, of course, included the £4360. The Company were doing a considerable business—possibly a much larger one than was the case twenty years ago; but the nature of the business of gas companies in general, and of the Peterborough Company in particular, had been much altered by events which had happened in recent times. There was, in the first place, the competition of electricity, which had been in existence in the city since 1902. The Company was formed in 1868; but the increase of business since then was no guide whatever, He should submit that a comparison even with the condition of things five or ten years ago was no guide. The Corporation, as he said, were in effective competition with the Company. The number of electrical units sold by them when they opened their electricity works in 1902 was 69,000 odd. In the following year it rose to 133,000; and this went on by constant rises without any break until 1908, when they sold 579,000 units. Having thus multiplied itself nearly ten-fold, and showing every prospect of rising, electricity was a very serious factor for the Company to deal with. But there was another important one. Owing to the competition of electricity and other causes, all gas companies had been led to introduce what was popularly called the penny-in-the-slot meter. The effect of this invention had been to enable the companies to extend their operations so as to attack a field of enterprise which would otherwise be closed to them, and consequently largely to increase the number of consumers. Of course, the prepayment consumers did not use anything like the same quantity of gas per family as a large household; and it was as costly to send a man round to take the proceeds of the sale of 5000 cubic feet of gas as it was to read the index which recorded the sale of 50,000 cubic feet. Consequently the companies' income was largely reduced. But, quite apart from this, there was the much more important factor that gas companies now had to provide all these meters, and in many cases to fit up the houses of the small consumers so as to induce them to take gas. All this involved outlay of capital, which fell entirely on the tenant. Therefore, assuming two companies earning exactly the same amount, one twenty years ago with no penny-in-the-slot meters, and the other, such as the appellant company, with these meters, the rateable values of the undertakings would be entirely different in the two cases, because the one had to provide much more tenant's capital for carrying on the business than the other. It was like comparing the business of a jeweller who had put in valuable fittings with that of the man who dealt in penny papers, and had no stock at all. The Company, who had an increasing turnover, was shown to have a lower rateable value because of the capital outlay which must be incurred in order to earn the proceeds. There was one other factor. The Company had been constantly reducing the price of gas, and by a resolution passed in August last, which took effect on the 1st of October, it was lowered by another 1d. per 1000 cubic feet. The penny-in-the-slot consumer paid 10d. per 1000 cubic feet more for his gas than the ordinary consumer; but for this he got certain things the cost of which was disguised in the extra charge. Dealing with the sum of £4550 which had been set down as representing the 17½ per cent. of the tenant's share of the capital, Counsel said, assuming he opened his works at Michaelmas, he would have to pay his coal and wages bill until Christmas, reckoning that there were no penny-in-the-slot meters, before there began to be any return. Then he would start his clerks going round to ascertain the number of feet recorded. Bills had to be made out and sent to the various consumers, and they had to wait until the money was paid. It was admitted, he thought—assuming that they were all ordinary customers—that up to three months, at any rate, there could be no question that the tenant must find the capital. He must also find it until he had sent out his index readers, sent out the bills, and got in the money. The only question between the parties was how long this interval was likely to be. He said five months; and it was for the Court to say whether this was right or wrong. He had five months' working expenses. The total working expenses for the year, not including rates, was £12,549. In this amount credit had been taken for the residual products sold by the Company as well as the gas; so that the coal bill had been reduced. If they ignored the residuals, including the sale of coke, the total outgoings of the tenant in the course of the year would be £20,751. If all the consumers were ordinary ones, and if five months was the right period before which the tenant could not expect to get in anything substantial from the consumers, then he would have to bear five-twelfths of the total outlay, which would be £8647. This was the figure which the tenant would actually pay away if he got nothing from the coke or from the ordinary consumer. But during the five months he would receive something from his coke. They had assumed that, on an average, coke would always be two months behind; so that at the end of the five months he would have been paid for three months' coke. Therefore from the £8647 they deducted £1775—three months' receipts from coke and other residuals. Turning again to the penny-in-the-slot consumer, Counsel said the collector visited him once every three months. If they assumed that the tenant started with an absolutely empty set of slot-meters on Michaelmas Day, he would not get anything at first, and they must take some sort of average allowance. They assumed that three months' receipts from these meters would be obtained in the first five months. They made a total of £3281, which represented the cash coming in from the business during the first five months, to go against the wages and other outgoings of £8647. This would leave the tenant with a burden of £5366 for the first five months. It was mentioned that the present value of the meters, lamps, cookers, &c., was £17,001; of horses and vehicles, £436; of maps and plans, £50; of the stock of coal, oil, and purifying materials (for eight weeks), £1783. Explaining the last item, Counsel said they must start with full bunkers, and they must never leave them absolutely empty. A fog lasting three days, for instance, would double the consumption of coal, and greatly impede its delivery by the railway companies. If they reduced the stock to less than eight weeks' supply, they were not only in peril of strikes, but were driven to paying the prices which happened to rule at the moment; so that the bargains had to be made beforehand. They had put down £1500 as cash at banker's; and the tenant's capital they said was roughly £26,000.

Evidence in support of the Company's case was then called.

Mr. *A. L. Ryde* said he had made the valuation for the appeal, basing his figures on the Company's accounts for 1908, from which Counsel had quoted. He had satisfied himself that the figures supplied presented a fair statement of affairs. Witness proceeded to give evidence substantiating Counsel's opening statement. He said the Company took their own fire risk; but, as a matter of fact, they had asked for

rates, and been offered 7s. 6d. per cent. The amount for which an insurance would have to be taken out was approximately £50,000.

Mr. RAIKES (in cross-examination) remarked that what they were dealing with was in effect this: What would a yearly tenant, coming in at a particular date, be prepared to pay in the way of rent? He would say at once that his clients had taken a different date as the basis of their calculations, and had considered what a tenant would have been prepared to pay who came in at the end of June, 1908.

Witness said he had had to do with six or seven gas companies in the last two months, and his experience in each case was exactly the same; the year up to June, 1908, was the best they had ever had.

In further cross-examination, witness said gas companies were limited in the amount of dividend they could pay, its increase depending upon a reduction in the price of gas. His attention being called to the outlay of £900 for a patent stoker which had not been placed to capital account, he said the machine was in the nature of an experiment, and might have been a failure, in which case the Company would not have been justified in charging the outlay to capital. Counsel pointed out that the stock of coal was valued at £1783; and witness explained that it was necessary to keep a heavy stock for such contingencies as fog, strikes, &c. Questioned on the subject of percentage, witness said he did not think any tenant would come in at less than 17½ per cent., consisting of 5 per cent. on his capital, 10 per cent. for profit, and 2½ per cent. for contingencies.

Mr. *Corbet Woodall* was the next witness. He said he put the rateable value of the Company's undertaking at £3088, or £2689 for their property in Peterborough Within. Examined as to the percentage, witness maintained that a return of £4700 was not too much on an undertaking such as this, into which a tenant would have to bring £27,000. Electricity had very largely taken the "plums" of lighting, such as theatres, railway stations, and music halls; and very often one single current was equal to some 2000 or 3000 prepayment gas installations. When it was reckoned that each of these cost £4 10s., it would be seen what an enormous expense was incurred in getting back what was lost. The prepayment system had largely increased the amount of capital needed by gas companies to obtain business.

Cross-examined as to the cost of maintenance, which he put at 7d. per 1000 cubic feet of gas produced, witness gave two instances that had recently come under his notice where the figure was more than 10d. On Counsel quoting from a list in which many estimates were as low as 4d., witness said he cited the two he had as having recently come under his notice. Counsel pointed out that with about £19,000 placed to the reserve fund, carried forward, &c., the Company were asking that they should be rated at a less sum than in 1900, when they had to take money from their reserve to help to pay the dividend. Witness replied that he did not see anything irreconcilable in that.

In re-examination, witness said the number of slot-meters had increased from 241 in 1902 to 1983 at the end of June, 1908; and a large expense was incurred for repairing those which were broken open by dishonest people. With regard to the stoking-machine to which reference had been made, witness explained that it served a double purpose—it put in coal and took out coke at the same time.

Mr. *John Barton*, the Company's Manager and Secretary, said that though the output of gas had increased, nearly £100 less wages had been paid, owing to the adoption of the stoking-machine alluded to, which was driven by electricity.

On Mr. Raikes rising to cross-examine,

The CHAIRMAN said it would be better if the cross-examination were taken all at one time. The case would therefore be adjourned till the 27th inst.

Another Kent County Gas Transaction.

In the Chancery Division of the High Court of Justice last Tuesday, before Mr. Justice Neville, an application was made by Mr. Fisher Williams in the matter of the Kent County Gaslight and Coke Company, as to the validity of a conveyance of property. Counsel said the question raised was whether or not certain freeholds comprised in the covenants were validly conveyed. Messrs. Darby and Gyde, two undischarged bankrupts, acquired for £2350 certain gas-works in Kent, which they sold to the Trustees of a new Company for £21,800. In the year 1902, Darby and Gyde, who was then known by the name of Bernard, entered into a partnership agreement, each putting £50 into the venture. The business was then that of stock and share brokers. On March 10, 1906, they took the conveyance of the gas-works, the parties being the owners, a Tunbridge Wells Finance Company, Darby, and others. Darby and Gyde were then trading as Darby and Co., in Lothbury; but it was under the style of F. C. Lawson and Co., of Cranbrook, that the gas deal was arranged. Their names seemed to have been very varied. His Lordship said he noticed that they were paid in cash; and if all their business was as successful as this, he wondered they became bankrupt. Mr. Williams said they were bankrupt before this. The Company continued until 1907, when the usual compulsory winding-up order was made; and it was then discovered that Gyde's real name was Bernard. Darby had been made a bankrupt in Cardiff in 1904 and Gyde in 1900. His Lordship held that the conveyance to the present owner was valid.

Lincoln Water Supply.—Satisfactory progress is reported in connection with the work at Elkesley, near Retford, for providing Lincoln with a new supply of water. Several members of the Lincoln City Council visited the scene of operations last Wednesday, and witnessed the test pumping at full work. At present a million gallons are being pumped every 24 hours; but the level of water in the bore has only been diminished to 60 feet. This is ample proof that there is an abundant supply, and the analyses of the water are of a very satisfactory character. When the test pumping is concluded, the pipes will be ordered and the other work pushed forward as expeditiously as possible.

MISCELLANEOUS NEWS.

MONTE VIDEO GAS COMPANY, LIMITED.

Big Reduction in the Price of Gas.

The Ordinary General Meeting of this Company was held last Thursday, at Winchester House, Old Broad Street, E.C.—Mr. T. C. TATHAM in the chair.

The SECRETARY (Mr. Henry Kearns) read the notice calling the meeting and the report of the Auditors; and the Directors' report (which was noticed in the "JOURNAL" last week, p. 463) and the accounts were taken as read.

The CHAIRMAN, proceeding to comment upon the various items of the accounts for the year 1908, said that if the shareholders would turn to the debit side of the balance-sheet they would find that the first item showing alteration was the reserve account, which had been increased to £32,000 by the addition of £4000 from the year's profits. He had on previous occasions drawn attention to the need of a strong reserve fund; and he felt that in placing this sum to the credit of the account they were making a wise provision. They would remember that this account at one time stood at £74,000; but it was reduced between 1897 and 1905 to about £24,000, by paying off debentures to the amount of £50,000. The insurance fund remained at £12,500. They insured against the risk of fire all their property in Monte Video that was of an insurable nature—a condition imposed by the trust deed securing the debenture stock—and the Directors thought that the amount as it stood was sufficient to meet any loss of property which was not of an insurable nature. They had placed £4000 to the reserve for renewals, &c., making a total of £6500. It would be necessary towards the end of the year to commence the reconstruction of a retort-house; and as this would be entirely a charge upon revenue, a substantial amount such as he had named reserved would go a good way towards reducing the future charge against the revenue account. The retorts and furnaces would be renewed upon the most modern lines; and the Board anticipated that the better results which they hoped to obtain in carbonization, coupled with the economy in fuel, would quickly justify the outlay. They could not delay the commencement of the work beyond the end of this year; and they intended to take advantage of the smaller make of gas during the summer months out there—from December to March, and so be ready for the following winter's consumption, which they anticipated would be a much heavier one than hitherto, owing to the very low price that was now charged for gas. On Aug. 1 last, the Company reduced the price by 20 per cent. for lighting; and their charge for industrial purposes, for engines, and for cooking was 25 per cent. lower than the lighting rate. The increased sales for the last five months of the year 1908 were on the whole satisfactory. The increase this year to the end of April (the latest date for which they had returns) was above the average for the five months from August to December last; and this, he thought, proved that the policy of cheap gas was appreciated by the public in Monte Video. The Board therefore expected to greatly enlarge their circle of customers. He had before remarked that it was far better for the Company to sell a greater quantity of gas at a reduced price to a large number of consumers, than a small quantity at a high price to a limited number; and at their present low charge there was no need for gas to remain the luxury that it formerly was in Monte Video. Had they sold at the new prices only the same quantity of gas in the five months of 1908 as they did in 1907, there would have been a reduced revenue of £4500. But, owing to the increase in the consumption—induced, he thought, by the lower price—they recovered £2400 of the loss; so that with five months' working at the lower price the reduction in revenue over that period amounted to only £2100—a result which he considered was quite satisfactory. The contingency account showed an increase of £2160—£2000 having been transferred from the year's profits, while £160 represented the increased market value of the investments. He thought this account need not be further increased in the present state of the Company's finances. Sundry creditors at Monte Video figured at £3427 more than in the previous year. This item represented various unpaid accounts for materials, &c., at the end of the year, and included wages accrued for the month of December which were paid in January, and part of the cost of a cargo of coal and the freight thereon, which was not settled until the whole cargo was discharged in January. The increase of £378 in London creditors was due in part to the heavier amount of income-tax accrued and payable to Dec. 31; and it also included the value of goods shipped, but not paid for until January. Turning to the credit side of the balance-sheet, the amount written off for depreciation—£4831—was about £150 less than for 1907; and there had been added £4617 for new mains, meters, and coal-stores, and the cost of another lighter which had been bought. The addition to the coal-stores had been rendered necessary owing to the larger stock of coal that must now be kept, to meet the increased make of gas; and another lighter was necessary to obviate any risk of demurrage in unloading coal cargoes. The stocks of coal were more by £2613, gas-fittings were £970 more, various materials required in the gas-works were £407 more, and stocks of materials, tools, and fittings for the dock and ship repairs were £1798 more. The stock of residual products stood at only £125, as there had been a good demand for them throughout the year. Sundry debtors and outstanding accounts showed the satisfactory decrease of £2288, and stood at £13,339, after deducting all items which were considered to be bad debts. Investments showed a small increase of £176; and they were all taken at their market value in drawing up the balance-sheet. A few changes in the securities had been made during the year. Other property exhibited an increase of £2806, due to payments made on account of the erection of the new offices and show-rooms. They hoped to get into the new premises at the end of this year. The large amount now paid for rent would then be saved; and when the upper portion of the building was let, the return on the capital invested would be a fair one. Shipments afloat, costing £3449, showed a decrease of £2589. They included fire-bricks, clay, a steel roof for the new coal-stores, and goods

of various descriptions. Bills receivable, in hand, and in transit, at £16,000, were £1000 less; while the cash in hand and on deposit was £11,960 more—showing that the Company were in a strong financial position. Dealing with the revenue account, the receipts from gas sold, residual products, &c., were £4823 more; and from the dock department there was an increase of £6842. The expenditure, however, had been increased by £11,842. It had been necessary to carbonize over 1100 tons more coal to meet the increased sales of gas; and the average cost, including freight, &c., was slightly higher than in the previous year. The roofs of the engine, boiler, and meter houses had also been renewed. The net profit from the gas department, after providing for these expenses, and notwithstanding the heavy reduction in the price of gas for five months of the year, was over £500 more than in the previous year. The dock department and sundries had yielded £30,884, or an increase, as he had stated, of £6842. With this large amount of work, taken under competitive conditions, the wages bill would naturally show a large increase. In addition, the Company were put to serious expense through a strike of their boiler-makers, just when things were exceedingly busy. It was necessary to incur heavy expenses in bringing men from Buenos Ayres; but they were quickly influenced by the Union, and almost at once returned. The strike was not successful, and ultimately broke down. The whole trouble arose because the Society insisted that the Company should employ four men who had been discharged for misconduct. In the best interests of the Company the Board could not submit to any dictation as to whom they should employ or whom they should dismiss. It was necessary, therefore, to face the strike, even at the risk of these extra expenses, and of temporarily driving business from the port. Thanks were due to the authorities and police for the assistance and protection that were afforded by them. The various items in the profit and loss account called for very little comment. The bad and doubtful debts were about £250 less; and the small amount that had to be provided this year reflected great credit on the officials. He hoped the time was near when the Directors would be in a position to declare a larger dividend. The expenditure necessary to renew the retort-house was now partly provided for; and the depleted accounts under the several heads he had mentioned had been strengthened, while the working capital was sufficient. They could not as yet tell for certain what the result of this large reduction in the price of gas would be at the completion of the year; but he had every reason to hope that it would increase the net profits. But whether it did or did not, he thought the shareholders would agree that the policy was the best one for the Company to adopt. He was addressing many old shareholders who had accorded to the Board their support throughout the troublous times through which the undertaking had passed; and they must feel, as he did, that the policy of the Directors had placed the Company in a strong financial position, and that when they were able to increase the dividend it would be in the confident belief that they would be able to maintain it. Old shareholders would remember that, when the Company lost the whole of the public lighting of Monte Video—which at one time produced £23,000 a year—they were placed in a very difficult position; and the commercial position of Monte Video, owing to revolutions and political troubles, did not for some time lend itself to the prosperity of a gas company. But notwithstanding this, the debenture debt had been paid off to the extent of £50,000, and the position of the Company improved generally. He concluded by moving the adoption of the report and accounts.

Mr. ROBERT MORTON seconded the motion.

Mr. E. PARKER YOUNG, while congratulatin g the Chairman on making an optimistic speech, said he thought the Board could have easily given them a dividend of 4 per cent., instead of 3½ per cent. He asked if the Municipality had paid what they owed.

The CHAIRMAN: There is no debt now; and under the Articles of Association you have no power to move an increased dividend.

Mr. R. GILES: Is the reduction in the price of gas a voluntary act on the part of the Board, or caused by the municipal authorities?

The CHAIRMAN: It is an entirely voluntary act on the part of the Board, not only to maintain, but to increase our business. We have competition with the Government electric light undertaking which is very keen.

Mr. YOUNG: Cannot you instal electric lighting?

The CHAIRMAN: We could; but it is not worth while. Continuing, he said that the feeling which guided the Directors was that when they increased the dividend, as they hoped they would do, they did not want to go back again. The progress which the Company had made during the past ten years, under by no means favourable circumstances, was something that the shareholders should be satisfied with. He did not for a moment say that 3½ per cent. was an adequate return to get out of a South American Gas Company. But it was not fair to take an abstract proposition like this without considering the particular circumstances. Of course, the Company were heavily capitalized; and they lost their concession. They really had the right to supply electricity; but it was no use fighting the Government, and the Board did the best they could.

The resolution was then carried *nem. con.*

The CHAIRMAN proposed the payment of a dividend for the half year to Dec. 31 of 8s. per share, less income-tax, making, with the interim dividend, 3½ per cent. for the year.

Mr. CHARLES HUNT seconded the motion, which was agreed to.

On the proposition of the CHAIRMAN, seconded by Mr. MORTON, Mr. John Mews was re-elected a Director of the Company, as was also Mr. Hunt, on the motion of the CHAIRMAN, seconded by Mr. MEWS.

Proposed by Mr. T. WILKINS, seconded by Mr. GILES, the Auditors (Messrs. G. Sneath and L. E. Halsey) were also re-appointed.

On the motion of the CHAIRMAN, seconded by Mr. MORTON, a vote of thanks was passed to the staff both at home and in Monte Video; and on the proposition of Mr. J. BENNETT, seconded by Mr. YOUNG, a similar compliment was accorded to the Chairman and Directors.

Gas Profits at Leigh.—The gas undertaking of the Leigh Corporation made a gross profit of £12,700 on the past year's working, and a net profit of £3238. In the previous year, the net profit was £850. There was an increased consumption of 500,000 cubic feet of gas, and the receipts from coke also increased.

THE PUBLIC LIGHTING OF CALCUTTA.

Offer by the Oriental Gas Company.

The Special Committee of the Calcutta Corporation appointed to consider and report on matters between the Corporation and the Gas, Tramways, Telephone, and Electric Light Companies, considered at their meeting on the 30th ult. a letter from the Manager of the Oriental Gas Company (Mr. James C. Watson), offering certain terms in connection with the new contract for the supply of gas for the lighting of Calcutta. The letter is as follows:—

I have the honour to inform you that your letter of Feb. 25 has been carefully considered by my Directors, and they request me to state their desire to acquiesce in the proposal that the new contract for the supply of gas for public lighting should exclude the maintenance, lighting, and extinguishing of the lamps, the supply of mantles, the supply and upkeep of lanterns, and all other expenses connected therewith.

They have read Mr. Mansfield's report on the 12th of February, a copy of which you were good enough to enclose in your letter;* and, while not accepting the value of tests made under the difficult circumstances to which he alludes, they think it better at this stage of the negotiations to avoid any remarks thereon, beyond a simple protest against the conclusions arrived at, and confine themselves to Mr. Mansfield's suggestions, submitted by him for your consideration, as follows: (1) The Gas Company concur, with the exception of the pressure. They submit that a minimum pressure of 15-10ths is ample. (2) The Gas Company agree to the contract being for twenty years. The alterations in the existing mains have been put in hand, and will be proceeded with in a thorough manner with all despatch and at a considerable expenditure. (3) The Gas Company could not pledge themselves to an unknown obligation, nor could they consent to be bound by future legislation applicable to gas supply in towns in England, the economic conditions of which may be wholly dissimilar from those in Calcutta. But, as heretofore during the past fifty years, they would do all that may be necessary to carry out their engagements with the Corporation. (4) As regards day pressure, this must be left to the discretion of the Gas Company, whose interests are to encourage the use of gas for purposes other than public lighting. (5), (6), (7), (8), (9) These suggestions are for the consideration of the Corporation, and every assistance will be given by the Gas Company to carry them out. (10) In this, the Gas Company fully concur.

As regards the price of the gas for the street-lamps, my Directors regret to state that they are unable to accept the rate of Rs. 2-4 per 1000 cubic feet suggested in your letter under reply. I am instructed to offer to supply gas for public lighting, under the conditions set forth in the present letter, at Rs. 3 per 1000 cubic feet. In quoting this price, I may be allowed to call your attention to the difference in the supply of gas in Calcutta as compared with England. The sale of gas in Calcutta is less than a million cubic feet per mile of main, whereas in English towns a consumption of more than 14 million cubic feet per mile is attained. The difference in the outlay for mains, therefore, necessitates a considerable difference in the selling price of gas.

The Company further stipulate that this price is for a minimum annual consumption of 150 million cubic feet (which is less than the total supplied last year), and that the amount of gas consumed is to be ascertained by the average quantity registered by meters affixed at the expense of the Corporation—at least one to every ten lamps. The necessary provisions in regard to extending the number of public lamps beyond the minimum of 9000, to defining the point at which the Municipality take over the supply of gas in the lamps, to testing meters and verifying tests, and the settlement of general clauses in the agreement, will be duly considered hereafter. The Company would be prepared to extend their mains to streets and thoroughfares not now lighted by gas, upon terms similar to those in their existing contract. This proviso would not apply during the last five years of the contract, when extensions of mains would be a matter for arrangement between the Corporation and the Company.

The preceding letter, and one from Mr. Alfred Mansfield regarding the submission of a detailed report to be given in consultation with the Directors of the Oriental Gas Company in London, were considered together; and it was resolved to ask Mr. Mansfield and Mr. Shirley Tremearne, who is now in England, to meet the Directors, discuss the question thoroughly with them, and let the Corporation know the result. The Committee pressed that the 2-feet pressure recommended by Mr. Mansfield should be maintained.

* The report was given in the "JOURNAL" for March 9 (p. 720).

Gas and Electricity Profits at Stoke-upon-Trent.

In presenting the annual financial statement at a recent meeting of the Stoke-upon-Trent Town Council, Mr. N. Emery, the Chairman of the Finance Committee, who announced an increase of 3d. in the pound in the district rate, said the Gas Committee, who handed over towards the rates last year a sum of £1400, which was equal to a 3d. rate, had found that the present charge for gas would not permit of any contribution this year, the figure being now reduced to as near as possible the actual cost, and they had but a small balance in hand to cover extensions for which the Council had no borrowing powers. The gas consumers now obtained the full benefit of the gas-works, and the ratepayers had to rely entirely on the rates by an increase of 3d. in the pound on a normal expenditure. Alderman Geen, the Chairman of the Gas Committee, said the Committee were acting in accordance with what would be the law after the Potteries towns were federated next year, for then gas would have to be sold at cost price, or, at all events, no profit could be made for the relief of the rates. Alderman Robinson said the Electricity Committee were in exactly the same position as the Gas Committee, as, but for having reduced the price of electricity to the bare cost of production, they would have been able to hand over a sum of upwards of £1000 to the district fund.

SMETHWICK GAS UNDERTAKING.

Annual Report.

The annual report and statement of accounts in connection with the Smethwick gas undertaking, for the year ended March 31, was issued on Saturday by the Secretary (Mr. W. J. Sturgess).

The total income on revenue account amounted to £63,644, a decrease of £2904. From the sales of gas the loss in revenue had been £1872, of which the reduction in price to large consumers which came into operation at the commencement of the year accounted for £1051; the remainder being due to diminished sales which (says Mr. Sturgess) "for the first time since the commencement of the undertaking in 1881 it is now my regrettable duty to record." The total quantity of gas sold and accounted for was 418,581,300 cubic feet; being 20,074,400 cubic feet short of the output in the previous year, or a decrease of 4·58 per cent. The total number of collections from prepayment meters during the year was 72,982; and the average amount of cash taken from each meter was 39s.—the average consumption of gas being 11,700 cubic feet. Prepayment meter consumers had increased by 11·81 per cent.; while, on the other hand, the ordinary consumers, at 2s. 7d., had taken 7·5 per cent. less, and the large consumers for lighting purposes 3·54 per cent. less. The day consumers for power and manufacturing purposes had fallen off 19·5 per cent.; while the consumption for public lighting had increased 9·99 per cent. Much of the falling off was due to bad trade, exceptionally light days, and the introduction of suction gas and electric installations by some of the large consumers. This falling off had affected their finances considerably. It touched them in every department and process of manufacture. At the same time, the cost of operating the concern and the amount of work done from day to day did not proportionately decrease. The quantity of gas unaccounted for, due to leakage and condensation, was 23,224,700 cubic feet, or 5·26 per cent. of the gas sent out, as compared with 4·91 per cent. last year. The cost of coal, though 1085 tons less were carbonized, was higher, on account of the increased prices; the average being 5¼d. per ton in excess, equal, on the total quantity carbonized, to £793. The length of mains at the end of the year was 50½ miles; and there were 1210 public lamps in the borough.

The gross profit on the year's trading was £18,012, compared with £20,518 for the previous year—a reduction of £2506. The balance at the beginning of the year was £7108. Against these items, had to be charged the necessary provision for interest on loans and the requisite instalments for redemption of the debt, amounting in the aggregate to £10,567, and leaving a net profit for the year of £7445, against £10,021 in the previous year—a decrease of £2576. From the net profit of £7445 had to be deducted the value of public lighting, £3934, now contributed free of charge by the Gas Committee in aid of the district rate, and the fourth instalment of £1000 on account of the Committee's contribution of the sum of £5000 towards the cost of the new Council House. This left £2510 to be carried to the depreciation and suspense fund account, against which had been charged the cost of laying the new 15-inch main for the Bearwood supply; leaving a balance of £1049 to the credit of the account. During the year they had not found it necessary to raise further money for capital purposes. The net debt stood at £147,175, against £151,554 in 1908. The capital expenditure at the end of the year amounted to £217,048, which was equivalent to 10s. 4d. per 1000 cubic feet of gas sold, against 9s. 10d. last year with the same plant.

EVESHAM CORPORATION GAS UNDERTAKING.

Gas Manager's Salary Increased.

At the Meeting of the Evesham Town Council last Wednesday, the minutes presented by the Gas Committee contained a resolution which had been unanimously passed by them to the effect that, in view of the satisfactory position and working of the Gas Department, the salary of the Manager (Mr. Percy H. Fletcher) be increased by £30 per annum, to commence from the end of next month.

In moving the adoption of the minutes, the Chairman of the Committee (Mr. W. A. Fisher) said the annual statement of accounts, as certified by the Auditor, had been received; and it afforded him pleasure to give the Council particulars of the year's working. The total receipts for the year amounted to £9081, and the expenses to £6432; leaving a gross balance of £2649. After giving details from the accounts, he said the sale of gas showed a satisfactory increase during the year; there were 147 new consumers; and the number of gas-stoves fixed was 132. The consumers on the books on March 31 last totalled 1356. He would just like to mention that the quantity of gas made during the year ending March 31, 1905—the first year he had the honour of being Chairman of the Gas Committee—was 30,934,000 cubic feet. The make during the year ending March 31 last was 44,010,000 cubic feet—showing an increase during the four years of 13,076,000 cubic feet. He thought the Council would agree with him that the gas undertaking was in a very sound financial condition. Referring to the minutes, Mr. Fisher said the Committee thought that during a portion of the year some people did not use their stoves, but still had to pay the hire. They therefore recommended that the cost of hiring be reduced 50 per cent. from the 24th of June. They also recommended that the Manager's salary be raised £30 per annum.

In seconding the motion, Alderman New remarked that the net profit on the year's working was more than £1600; and he felt sure there would be no question about using some of the surplus to increase the salary of their excellent Manager. Mr. Fletcher deserved the utmost credit for the way in which the gas-works had been conducted since they had been under his management; and not only the members of the Council, who had the matter before them in detail, but all the ratepayers must admit that he was responsible for the excellent condition of the works and the large amount of profit of which eventually they would have the benefit. The minutes were approved.

HINCKLEY GAS SUPPLY.

At the last Meeting of the Hinckley Urban District Council, the Gas Manager (Mr. F. Lee) presented his report for the year ended March 31. He stated therein that the amount expended on capital account during the year was £1054, of which £129 was for new mains and services, £436 for new meters, £450 for new stoves, and £39 for fittings; the whole having been paid for out of profits. The total expenditure on the special renewals account was £2037; the chief items being £1054 for new offices, store-rooms, and workshops, £919 for laying a new 9-inch main to Burbage, and £36 for a new 4-inch main in Hollycroft. During the year, in addition to the ordinary instalment of £1203, a sum of £1000 was placed to the sinking fund out of profits. Loans amounting to £2609 were repaid during the year. The total receipts were £13,526, and the working expenses £8310; the gross profit being £5216. Interest on loans came to £1329, and the payment to the sinking fund to £1203; leaving a net profit of £2684—being £822 less than in the preceding year. This was caused by the reduction of 2d. per 1000 cubic feet in the price of gas, the allowance of stove-rents to consumers using slot-meters, the increased cost of coal, higher charges for rates, taxes, interest, and sinking fund, and reduced revenue from residuals. The coal used during the year was 6967 tons, compared with 6826 tons in 1907-8. The gas made was 75,106,000 cubic feet, compared with 73,640,000 cubic feet; being an increase of 1,466,000 cubic feet. The quantity sold was 72,783,600 cubic feet, or an increase of 1,543,200 cubic feet; while the unaccounted-for gas was 1,192,400 cubic feet, or 1·59 per cent. During the year, £260 was transferred to the general district rate.

In moving the adoption of the report, Mr. Kinton remarked that it showed the Council had had another successful year. The gas sales had increased by 1½ millions; and but for depression in trade, which caused less gas to be consumed in factories, there might have been a larger profit. The additional consumption was owing to prepayment meters, which had increased considerably in Hinckley and Burbage. Altogether, the report was a satisfactory one; and though the profit was £822 less than before, this was accounted for by the 2d. per 1000 cubic feet reduction in the price of gas and the allowance of stove-rents. The Gas Committee recommended that, in addition to the sum of £1054 already placed to the capital account, and £864 to the special renewals fund, the sum of £520 should be transferred to the general district rate, and that the balance of £244 be carried forward. They also recommended certain reductions in the meter-rents, which would absorb about £100 of the profits; but it was a step in the right direction, and would go towards abolishing meter-rents altogether. As to the transference of £520 in relief of the rates, it would be a considerable help to ratepayers. The report was unanimously adopted.

GAS PROFITS AND THE RATES AT WIGAN.

At the Meeting of the Wigan County Borough Council last Wednesday, Alderman Gee, the Chairman of the Finance Committee, laid before the members his annual budget. In the course of his speech, he announced that the district rate would be reduced 4d. in the pound, and referred incidentally to the generous contribution made by the Gas Committee to the rates. This elicited from Mr. Fletcher a few remarks on the policy of applying the gas profits in this way. He said the Chairman of the Finance Committee had congratulated the Gas Committee on having handed over £4000 to the relief of the rates; but did they think the thanks of the gas consumers were due to the Committee? He knew it was a ticklish point; but he liked to get at a just basis if he could in his public representation, and he did not think this was fair. There was a big assessment in the town that did not contribute anything to the gas profits. There were companies and individuals who produced their own light simply because they could do so cheaper than they could buy it from the Corporation. The Chairman of the Finance Committee had said that if it had not been for the Gas Committee handing over £4000 of profits, the district rate would have been increased to 5s. 4d. in the pound. But seeing that this money came from the gas consumers, it was they who were paying for the reduction of 4d.; and this was unjust. The only way to be fair all round was to make every ratepayer bear a just share of the responsibility; and he declared that they had no right to ask the gas consumers to relieve the rates of people who were not consumers. He was not going to move that the gas profits be not used for the rates. All he was doing was pointing out to the Council and to the town that certain things were being done which, in his opinion, were not just; and he hoped that in the near future they would realize that it would be better to have cheaper gas than that gas consumers should be called upon to relieve the rates of people who did not use gas. Alderman Ashton, dealing with the same subject, remarked that the question as to the use of the gas profits for the relief of the rates, raised by the previous speaker, was a very debateable one. In the case of people producing their own light, the gas consumers did, of course, help to keep their rates down; but there was another side to the question. For instance, they were handing over from the rates £5000 to the tramways; and, of course, the big companies would have to help in paying this. Consequently, what they got from the gas they paid back to the trams, and one was a set-off against the other—at the present time, at any rate.

Before the Liverpool Stipendiary Magistrate last Thursday, a young man named George Edwin Wake pleaded guilty to four charges of having obtained money in Liverpool last year by falsely representing that he was a manufacturer of gas-fittings and mantles which would reduce gas consumption to one-half. At present, it was stated, the prisoner was serving a sentence of six months for similar offences at St. Helens. He was now sentenced to eight months' imprisonment, to follow the St. Helens term.

MR. L. W. S. ROSTRON ON CO-PARTNERSHIP.

At the Caxton Hall, Westminster, last Wednesday evening, Mr. Laurence W. S. Rostron, Barrister-at-Law, gave an address, under the auspices of the London Municipal Society, on "Co-partnership and Profit-Sharing," in which he referred to the principle as adopted by various gas undertakings and other businesses in different parts of the country.

At the outset, the speaker dealt with the subject theoretically, claiming that it was a most desirable system to introduce into a company, as it gave the workers a better interest in their work, with the result that the companies had a more contented body of employees. Further, it was good for the men, as it gave them a safe investment for their savings. There was no greater argument in favour of the system than the fact that it brought employers and employees closer together. Nationally it was true that nothing could be worse than ill-feeling between capital and labour. Regarding co-partnership from the social standpoint, Mr. Rostron expressed the opinion that it would tend to increase industrial efficiency. He thought it would be almost universally admitted that the system was sound theoretically; but was it practicable? This was the object he had set himself to prove in his address; and he thought he could show that it had been fully demonstrated that co-partnership had conferred great benefits on all classes of the community. In support of his contention, he mentioned that at the present time sixteen gas companies had adopted the principle; this number including all the London and a number of the Suburban and Provincial Companies. The system, which was started by the South Metropolitan Gas Company twenty years ago, was, he thought, capable of being very considerably extended if employers would only take up the matter with some spirit, and follow the example of the late Sir George Livesey. In conclusion, the speaker considered the movement from a general point of view.

An interesting discussion followed, in which Mr. Appleby, who is connected with the South Metropolitan Gas Company, remarked that the employees of that Company were better off than those of any other company in England. They wanted, he said, the men to share in the responsibility of the firm. Mr. Henry Austin, a Workman-Director of the Company, as one who had been on the Board for nine years, paid a tribute to the late Sir George Livesey, and characterized the co-partnership system as the salvation of the working man. He added that if people were there discussing this subject instead of being in "another place," he thought they would be far better employed.

The proceedings terminated with a vote of thanks to Mr. Rostron for his address.

Malta and Mediterranean Gas Company, Limited.—The balance of the general revenue account of the Company for the year ending March 31 is £5867. The Directors recommend the payment of the usual dividends on the first and second preference capital, and a dividend of 4 per cent., free of income-tax, on the ordinary capital; making, with the interim dividend paid in December, 6 per cent. for the year, and leaving a balance of £990 to be carried forward.

SALES OF STOCKS AND SHARES.

The keen competition which was in evidence at the sale conducted by Messrs. A. & W. Richards at the Mart, Tokenhouse Yard, E.C., on the 11th inst., as noticed in the "JOURNAL" last Tuesday, was repeated that day, when they made four new issues of capital for gas and water companies; some £25,000 worth of stocks and shares being sold in a very short time. The first lots consisted of an issue of 4 per cent. perpetual debenture stock of the Aldershot Gas and Water Company; and it fetched from £102 5s. to £103 10s. per £100 of stock. Some £10 "B" shares in the Tendring Hundred Water Company were next offered, and realized £10 10s. to £10 15s. each. New issues of £2000 of 4 per cent. perpetual debenture stock and £3000 of consolidated ordinary stock of the Chigwell, Loughton, and Woodford Gas Company were then offered. The former fetched from £100 to £100 15s., and the latter (which will carry interest at the rate of 5½ per cent. per annum) £111 10s. to £113, per £100. The final lots consisted of £4000 of consolidated stock and £3000 of 4 per cent. perpetual debenture stock of the Uxbridge Gas Company; and the prices realized were £112 to £112 15s. per £100 for the former (which ranks with similar stock on which 5½ per cent. per annum was paid last year), and £100 to £100 5s. per £100 for the latter. At a recent sale by auction, some "A" stock of the Wellington (Somerset) Gas Company, carrying 10 per cent. dividend, fetched £180 per £100. Last Wednesday, Messrs. Nock and Josland sold some fully-paid "A" shares (£5) in the Bilston Gas Company at £11 15s. each, and some "B" shares at £8 apiece.

RICHMOND (SURREY) WATER SUPPLY.

Additional Filter-Beds and Other Works.

Some time ago, the Water Committee of the Richmond (Surrey) Corporation instructed Mr. Joseph Quick, M.Inst.C.E., to prepare a special report on a proposal to construct filter-beds and other works to improve the quality of the water obtained from the existing well in Petersham Meadow, in accordance with the recommendation of Dr. Klein and the Medical Officer of Health (Dr. Crocker). Mr. Quick accordingly conferred with the Water Engineer to the Corporation (Mr. W. G. Peirce) on the subject of the quantity of water which would have to be dealt with; and he came to the conclusion that provision should be made for treating 250,000 gallons per day. The site proposed for the filter-beds was one selected by Dr. Klein, who was guided by consideration of its isolation, as far as possible, from any risk of contagion. According to Mr. Quick's report, it is proposed to construct two filter-beds, each capable of passing the above-named quantity of water per day when working at the minimum rate of 50 gallons per square foot. In the ordinary way, both filters will be available except during cleaning out, which, with the water of the kind that will pass through them, will, it is believed, be comparatively seldom. Mr. Quick had to consider the relative advantages of conveying the water from the present well to a proposed new dummy well to be constructed in an existing

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 502.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17⅛–18	..	5 11 1
258,955	10	,,	7	Do. 7 p.c.	12¼–12⅝	..	5 9 10
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	96–100	..	4 0 0
200,000	5	Oct. 29	6⅛	Bombay, Ltd.	5⅝–6	..	5 8 4
40,000	5	,,	6⅛	Do. New, £4 paid	4¼–4⅜	..	5 15 6
50,000	10	Feb. 25	14	Bourne-mouth Gas and Water	6 p.c.	29¼–29½	.. 4 14 11
51,810	10	,,	7		B 7 p.c.	16⅞–17	.. 4 2 4
53,200	10	,,	6		Pref. 6 p.c.	15⅝–15⅞	.. 3 15 7
380,000	Stk.	,,	12½	Brentford Consolidated	250–252	+1	4 19 2
300,000	,,	,,	5⅛	Do. New	189–191	..	4 19 6
50,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	101–103	..	3 17 8
220,000	Stk.	Mar. 12	10⅝	Brighton & Hove Orig.	212–214	..	5 0 6
246,320	,,	,,	7⅛	Do. A Ord. Stk.	154–156	..	4 19 4
460,000	20	Apl. 16	10	British	42½–43¼	..	4 12 6
109,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c.	117–119	+1	5 0 10
165,700	,,	,,	4½	Do. do. 3½ p.c.	87–89	+1	5 1 2
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13¼–13⅜*	..	5 1 10
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	4⅛–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5½–6	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48–49	..	6 2 5
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	77–79	..	5 13 11
157,153	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅛	Commercial 4 p.c. Stk.	108–110	..	4 14 6
560,000	10	,,	5	Do. 3½ p.c. do.	102–104	..	4 16 2
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	82–84	..	3 11 5
800,000	Stk.	,,	6¼	Continental Union, Ltd.	100–102	+1	6 7 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	139–141	..	4 19 3
493,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
143,995	,,	Mar. 31	5	East Hull 5 p.c. Ord.	97–99	..	5 1 0
486,190	10	Jan. 28	12	European, Ltd.	24–24½	+⅛	4 18 0
554,663	10	,,	12	Do. £7 10s. paid.	18–18⅜	+⅛	4 17 4
15,161,545	Stk.	Feb. 11	4/10/8	Gas light and Coke	4 p.c. Ord.	103½–104½	+½ 4 6 6
2,620,000	,,	,,	3½		3½ p.c. max.	88–89	.. 3 18 8
3,799,735	,,	,,	4		4 p.c. Con. Pref.	135–107	.. 3 14 9
4,193,975	,,	Dec. 11	3		3 p.c. Con. Deb.	85–86	.. 3 9 9
258,740	Stk.	Mar. 12	4⅜	Hastings & St. L.	3½ p.c.	93–95	.. 5 0 0
82,500	,,	,,	6¼	Do. do.	5 p.c.	115–120	.. 5 4 2
70,000	10	Apl 29	11	Hongkong & China, Ltd.		17½–18	.. 6 2 3
123,500	Stk.	Mar. 12	6⅛	Ilford "A" and "C"		135–137	+1 4 14 11
65,781	,,	,,	5	Do. "B"		103–105	.. 4 15 3
63,000	,,	Dec. 30	4	Do. 4 p.c. Deb.		102–104	.. 3 16 11
4,949,000	Stk.	May 13	8	Imperial Continental		181–183*	–1 4 7 5
473,600	Stk.	Feb. 11	3½	Do. 5½ p.c. Deb. Red.		95–97	.. 3 12 2
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.		120–122	.. 4 18 4
561,000	Stk.	Feb. 25	10	Liverpool United A.		225–227	.. 4 8 1
718,100	,,	,,	7	Do. B		168–170	.. 4 2 4
306,083	,,	Dec. 30	4	Do. Deb. Stk.		105–107	.. 3 14 9
55,000	5	Dec. 11	6	Malta & Mediterranean		4⅝–5	.. 6 0 0
500,000	100	Apl. 1	5	Met. of 5 p.c. Deb.		100–102	.. 4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.		101–103	+1 4 7 5
541,920	20	Nov. 13	3½	Monte Video Ltd.		12½–13	.. 5 7 8
1,775,892	Stk.	Feb. 25	4½	Newc'tle & G't sh'd Con.		106¾–107½	.. 4 3 9
515,595	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.		91–93	.. 3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.		19⅝–20	.. 5 0 0
55,940	10	,,	7	Do. 7 p.c.		13–13½	.. 5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.		137–139	.. 5 15 1
60,000	5	Mar. 31	8	Ottoman, Ltd.		6–6¼	.. 6 8 0
3,820	53	Feb. 25	13	Portsea Island A.		137–139	.. 4 19 0
60,000	50	,,	13	Do. B.		129–131	.. 4 19 3
100,000	50	,,	12	Do. C.		119–121	.. 4 19 2
114,800	50	,,	10	Do. D and E.		101–103	.. 4 17 1
398,490	5	May 13	7	Primitiva Ord.		6⅜–7*	.. 5 0 0
796,383	5	Jan. 28	5	Do. 5 p.c Pref.		5¼–5⅜	+⅛ 4 10 11
483,900	100	Dec. 1	4	Do. 4 p.c Deb.		95–97	.. 4 2 6
1,100,000	10	Apl 29	8	River Plate Ord.		14⅜–15	.. 5 6 8
312,650	Stk	Dec. 30	4	Do. 4 p.c. Deb.		95–97	.. 4 2 6
250,000	10	Mar. 31	8	San Paulo, Ltd.		13¾–14¼	.. 5 12 3
62,500	10	,,	—	Do. 6 p.c. Pref.		11⅝–12	.. 5 0 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.		50⅛–51⅛	.. 4 17 1
135,000	Stk.	Mar. 12	10	Sheffield A		236–238	.. 4 4 0
209,981	,,	,,	10	Do. B		233–235	.. 4 5 1
523,500	,,	,,	10	Do. C		233–235	.. 4 5 1
50,000	10	Oct. 29	10	South African		14–14⅛	.. 6 17 11
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.		123–125	.. 4 5 4
1,895,445	,,	Jan. 14	3	Do. 3 p.c. Deb.		85–86	.. 3 9 9
209,820	Stk.	Mar. 12	8	South Shields Con. Stk.		152–154	.. 5 3 11
605,000	Stk.	Feb. 25	5⅛	S'th Suburb'n Ord. 5 p.c.		120–122	.. 4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.		122–124	.. 4 0 8
117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.		124–126	.. 3 19 4
502,310	Stk.	May 13	5	Southampton Ord.		107–109*	.. 4 11 9
120,000	Stk.	Feb. 25	6¾	Tottenham and Edmonton	A 5 p.c.	132–134	.. 5 0 9
423,940	,,	,,	5¼		B 3½ p.c.	110–1 2	.. 4 13 9
149,470	,,	Dec. 30	4		4 p.c. Deb.	101–103	.. 3 17 8
123,320	10	,,	8	Tuscan, Ltd.		8⅞–9⅛	.. 8 13 0
149,900	10	Jan.	5	Do. 5 p.c. Deb. Red.		101–103	.. 4 17 1
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.		105–107	.. 4 13 6
255,666	Stk.	Feb. 25	6¾	Wands-worth	B 5½ p.c.	133–141	.. 4 12 2
79,416	,,	Dec. 30	3		3 p.c. Deb. Stk.	73–75	+1 4 1 1
895,572	,,	Feb. 25	5½	West Ham 5 p.c. Ord.		121–123	+2 4 5 4
210,000	,,	,,	5	Do. 5 p.c. Pref.		125–127	.. 3 18 9
253,500	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.		107–109	.. 3 13 5

Prices marked * are "Ex div."

building used as a potting-shed, through a suction-pipe upwards of 400 yards in length, or laying a main from the bottom of the well at a sufficient depth to allow the water to flow by gravitation to the new well. He advised the adoption of the latter course, though it would cost approximately £467 more than the suction-pipe. The water will be lifted on to the filters by means of gas-engines in duplicate, each capable of raising 12,500 gallons per hour with one set of three-throw pumps, which could be worked by either engine. The proposed works are estimated to cost £5463. Mr. Peirce reckons that the annual working expenses, exclusive of the interest and sinking fund, will be £573; but Mr. Quick considers they might be reduced to £473, or rather more than 1d. per 1000 gallons. Adding £300 for the repayment of the loan and for interest, the total cost would be less than 2d. per 1000 gallons, compared with 6d. per 1000 gallons which the Corporation now pay to the Metropolitan Water Board.

Having considered the report in detail, the Water Committee agreed with Mr. Quick's suggestion, and referred the matter to the Finance Committee for them to make the necessary arrangements in the event of the recommendation being agreed to. When the report came before the Town Council, it was stated that since the use of the Petersham well supply had been discontinued, the Corporation had paid £2000 a year more to the Metropolitan Water Board. The recommendation was adopted.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *May* 22.

The market has been quiet throughout the week. Available supplies have not been very large at any point; but buying has been perfunctory, and prices have been fairly maintained. The closing quotations are £11 per ton f.o.b. Hull, £11 2s. 6d. per ton f.o.b. Liverpool, and £11 6s. 3d. per ton f.o.b. Leith. Makers' prices for forward delivery are for the most part quite above the ideas of buyers. Meantime there is speculative offering abroad at the equivalent of £11 5s. per ton f.o.b. for delivery up to the end of the year, but it does not seem to be meeting with a very ready response.

Nitrate of Soda.

Local supplies being somewhat limited, the spot market remains firm at 10s. 6d. per cwt. for 95 per cent., and 10s. 9d. for refined quality, though the spring demand is nearing its close.

Tar Products. LONDON, *May* 24.

Tar products have been steady throughout the past week; while pitch is decidedly firm. Though there is no business doing for prompt delivery, and prices for delivery between now and June are purely nominal, for forward delivery business has been done at very good figures, and makers are not at all inclined to sell any further quantity unless they can obtain an advance in price. There is a slight lull in business in South Wales at present—which is not to be wondered at, seeing how heavily they have bought during the last month or two, and the considerable doubt which prevails as to whether there will be a strike in this district. The Continent appears to be abstaining from buying as far as possible. It is, however, known that, in certain quarters at any rate, parties are not at all well bought, and must sooner or later come into the market; and when due consideration is given to the fact that pitch is not at all plentiful in England, it is probable that we shall see a still further advance. Creosote is steady. In London, makers are more disposed to sell for near delivery; but in the Midlands and the North, they are apparently well sold. Benzol is very quiet, and sales are difficult to negotiate; while Continental manufacturers are offering, to the French consumers in particular, at prices even below the parity of those in England. Toluol is steady, but there is not much business doing. Solvent naphtha is firm in London, but quiet in the North. Heavy naphtha is steady, but there is not much business to report. Carbolic acid remains firm, but there is no disposition on the part of actual consumers to purchase.

The average values during the week were: Tar, 14s. 3d. to 18s. 3d., *ex* works. Pitch, London, 27s. to 27s. 6d.; east coast, 26s. 6d. to 27s.; west coast, 25s. 9d. to 26s. 9d. f.a.s. Mersey ports, 26s. to 27s. f.o.b. others. Benzol, 90 per cent., casks included, London, 5⅜d. to 6d.; North, 5⅛d. to 5⅜d.; 50-90 per cent., casks included, London, 6⅛d. to 6⅜d.; North, 6d. to 6¼d. Toluol, casks included, London, 8⅛d. to 8⅜d.; North, 7⅛d. to 7¼d. Crude naphtha, in bulk, London, 3⅛d. to 3⅜d.; North, 3d. to 3⅛d.; solvent naphtha, casks included, London, 11d. to 11⅛d.; North, 9⅜d. to 10d.; heavy naphtha, casks included, London, 10⅜d. to 11⅛d.; North, 9⅜d. to 10⅛d. Creosote, in bulk, London, 2⅜d. to 2 1/16d.; North, 2⅛d. to 2⅜d. Heavy oils, in bulk, 2⅛d. to 2 1/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 2d.; west coast, 1s. 1d. Naphthalene, £4 10s. to £8 10s.; salts, 35s. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1⅛d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been steady throughout the week, but towards the end there appeared to be slightly more inquiry, and it is possible that prices have touched bottom. The Gas Company maintained their price; but it is possible to buy outside stuff on Beckton terms at £11. In Hull, £11 is reported to have been accepted; and in Liverpool, £11 1s. 3d. In Leith, makers are well sold, and are very firm in their ideas. The firmness of nitrate of soda, if continued, must ultimately have its effect on sulphate of ammonia.

According to a telegram from Berlin which reached London through Reuter's Agency, there was an explosion in the gas-works at Charlottenburg last Wednesday morning, by which five persons were severely injured.

BILLS REDUCED

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COAL TRADE REPORT.

Northern Coal Trade.

There is a steady demand for coal, though a little less pressing than was the case a month or so ago. The output is generally maintained; and, on the whole, it is well taken up. In the steam coal trade, best Northumbrians are from about 12s. 1½d. to 12s. 3d. per ton f.o.b., and some of the collieries appear to be well sold ahead. Second-class steams vary from about 10s. to 10s. 6d. per ton; and steam smalls are in good demand at from 5s. 6d. to 6s. 6d. There is a good request for gas coal for this season, though the deliveries on the long contracts are now very low to what is known in the winter. Durham gas coals vary from about 9s. to 10s. 3d. per ton f.o.b., according to quality, for the usual classes; while for best "Wear" specials," up to 11s. 3d. is quoted—the latter having been well sold forward. A few small contracts are in the market. The amounts, however, are not likely to influence the prices to any great extent, though there is the uncertainty as to the effect that the Eight Hours Act may have on the production and price after the end of next month in other districts than those of Northumberland and Durham; so that until there is some settlement made, forward business is still generally limited. At the same time, there is more disposition to take a favourable view of the result of the negotiations between coalowners and miners. Coke is steady; and gas coke is rather firmer at 13s. to 13s. 3d. per ton f.o.b., the production being less.

Beyrouth Water-Works Company, Limited.—Last Tuesday week, an extraordinary general meeting of the Company was held at the London Offices for the purpose of considering a resolution for the sale of the assets and undertaking to Messrs. Sabbag et Cie., for the sum of £100,000. Mr. W. T. Western, who presided, remarked that the expectation held out by the promoters when the Company was formed 35 years ago had not been fulfilled. The cost of the works was large, and the revenue was much less than was anticipated. It would be necessary for them to raise extra capital, and under existing conditions there would be difficulty in doing so. But a group of bankers in Paris had acquired a large interest in the Company, representing a majority of the shares and of each class of debentures. They considered that the best way of meeting the situation was to start an entirely new Company, and liquidate the existing one. Under the arrangement, they would pay £100,000 for the property, and meet the liabilities. This would not be enough to pay off the debentures in full; but under the scheme they would receive £90,000 of the purchase-money, and the remaining £10,000 would go to the shareholders, giving them 10s. a share. In reply to a shareholder, the Chairman said there were £85,000 first debentures, and approximately £100,000 second debentures. The proposal was agreed to; and a resolution for winding up the Company was also passed.

Nuisance Caused by Washings from Producer-Gas Plants.

The annual report of Dr. Collingridge, the Medical Officer of Health for the City of London, which was issued on Saturday, contains the following references to the nuisance of washings from gas-producer plant: "Of recent years, the use of producer gas in the City for motive purposes has considerably extended; but this form of power is not without some disadvantage, as shown by several complaints of nuisance from gas washings inseparable from the process unless properly treated. There can be no objection to this system of gas making for utilization in engines instead of coal gas, provided no nuisance is created thereby; but the trouble in several cases has been caused by the abominable odour of the effluent, which contains sulphuretted hydrogen. Further, it is a direct contravention of the City of London Sewers Act, 1848, to discharge any gas washings into the public sewers. Section 76 is as under: 'And be it enacted, that if any gas company or person making, manufacturing, or supplying gas, shall at any time empty, drain, or convey, or permit or suffer to be emptied, drained, or conveyed, or to run or flow, any washings or foul or waste water, or any noisome or offensive liquid, substance, or thing that may arise or be produced in the making of gas, into any public sewer or drain, every gas company or person so offending shall forfeit and pay the sum of two hundred pounds for each and every day during which any such washing or foul or waste water, or other noisome or offensive liquid, substance, or thing, shall be permitted or suffered to flow into any public sewer or drain.' It has been found by experiment that the odour of sulphuretted hydrogen with which these gas washings are charged can be practically eliminated by the use of permanganate of potash, the addition of which to the washings in a settling-tank produces an effluent to which little or no exception can be taken. Such treatment abated the nuisance in each of the cases reported last year; and on the advice of the City Engineer the discharge of the treated effluent was limited to the hours between 8 p.m. and 8 a.m. Each case of this kind will be dealt with on its merits, and the effluent examined from time to time. No further complaints have been received."

Gas Poisoning at Norwich.—On the morning of Saturday, the 15th inst., Samuel Paston, aged 55, a retired sergeant-major of the 3rd Dragoon Guards, who had recently taken over the Festival House public-house at Norwich, was found dead in bed. For several days deceased and his wife had been removing their furniture, &c., to their new abode; and on the evening before his death he slept there alone. Shortly before ten o'clock on Saturday morning, Mrs. Paston returned to the Festival House, and, not finding her husband about, went upstairs and knocked at his bedroom door. As she obtained no answer, she entered the room, which she found to be full of gas. She immediately broke the window, and on turning to the bed found that her husband had been dead for some time, his death having no doubt been caused by gas poisoning.

The "CITO."

Combined Hotel Griller and Hot Closet on Stand.

Our Policy—

To devise new things which shall afford Gas Undertakings fresh outlets for their Sale of Gas, has always been notable for

Its Success.

This Year we have introduced new and important Cooking Appliances for—

Hotels, Restaurants,

Clubs, Schools,

Public Institutions, &c.

These have already been widely adopted, and are bound to effect a large increase in the Gas Sales of those Gas Undertakings who add them to their Lists, by securing a most important and remunerative class of Consumer.

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

198.

Gas for Treeton and Catcliffe.—At a recent meeting of ratepayers and property owners of the villages of Treeton and Catcliffe, near Rotherham, a Canvassing Committee presented their reports showing a good percentage of the inhabitants willing to accept gas, and sixty names were submitted of people willing to take shares. Subsequently, a meeting of the latter was held, at which upwards of £1000 of capital was subscribed.

Gas and Electricity Supply at Brighouse.—At the meeting of the Brighouse Town Council last Thursday, the report on the Gas and Electricity Department for the past financial year showed that the total gas made was 153,377,000 cubic feet, or a decrease on the previous year's total of 10,253,000 cubic feet. Residuals realized £6173, against £6335. The aggregate income was £25,792, and the profit made was £1259. On the electricity works there was a deficiency of £482. Alderman Healey, in moving the adoption of the report, remarked that it was satisfactory in so far as the balance of profit was a little more than it was a year ago. They regarded last year's profit, however, as exceptionally low. The Committee were disappointed with the result of the year's working; but there was no need, they thought, for despair. They were advertising for a new Manager; and they were expecting that, when the change had taken place, better results would be obtained. The Electricity Department, they were sorry to say, was in a poor condition. This, however, was soon to be closed, so far as the old premises were concerned. The report was adopted.

Lurgan Water Supply.—At the last meeting of the Lurgan Urban District Council, the report of the whole Council in Committee, held for the purpose of considering the recommendations of Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the Metropolitan Water Board, London, as to the best means of detecting waste of water in the town and as to how to improve the system of filtration at the water-works, was read. Mr. Bryan stated that the average consumption of water for the whole town between the hours of 1 and 5 a.m. from Jan. 27 to April 6 was at the rate of 6400 gallons per hour. It was clear that between these hours there could be no legitimate use for this very large amount of water; and he believed there was scope for the saving, by careful inspection, of 120,000 gallons per day—possibly of much more. In order to locate the leakage and waste, he suggested that the Council should adopt the Deacon meter system of waste detection, which would involve the purchase of one or two 6-inch meters and the making of bye-pass connections at suitable places in the town. Referring to filtration, Mr. Bryan suggested that brick or concrete chambers should be constructed inside each filter-bed adjoining the present filtered water outlets, and that an automatic floating weir regulator should be attached to each outlet. This would allow of approximately 135,000 gallons of water being filtered during the interval that the pumps were not at work, which would tend to equalize the rate of filtration throughout the 24 hours. His estimate for doing the work would be between £300 and £400. The recommendations were unanimously adopted; and it was agreed to apply to the Local Government Board for sanction to a loan of £500 to carry out the work.

Proposed Purchase of the Northwich Gas-Works by the District Council.—At the meeting of the Northwich District Council last Tuesday, it was reported that a Committee had interviewed the Directors of the Northwich Gas Company on the proposed purchase of their undertaking. The Directors received the Committee in a friendly spirit, and suggested that the Council should ascertain the approximate value of the undertaking on the usual basis, and then decide whether they would proceed with the negotiations. The matter was referred to the Finance Committee for this purpose.

Assessment Appeal by the Mitcham and Wimbledon Gas Company.—The Kingston-on-Thames Union Assessment Committee recently considered an appeal by the Mitcham and Wimbledon Gas Company against the new assessment of £8300 gross and £4156 net of their property in the parish of Wimbledon. The original figures were £4271 gross and £3417 net. Mr. A. L. Ryde, for the appellants, argued that the fair rateable value would be £2947. It was finally agreed between the parties that the figure should be fixed at £3700. A sum of £460 was taken off the gross assessment; reducing it to £7840.

Portsmouth Water Company.—At the half-yearly general meeting of this Company last Thursday, the Directors reported that the balance on the profit and loss account available for distribution was £27,284; and they recommended the payment of the full statutory dividends. After deductions for void houses and bad debts, there would be a balance of £7935 to be carried forward. The revenue for the half year was £35,506, and the expenditure £14,011. The Chairman (Mr. W. Grant, J.P.), in moving the adoption of the report, said the most striking feature in the accounts was the diminution in some of the items of expenditure, for which they had to thank their Engineer (Mr. Herbert Ashley, M.Inst.C.E.). Colonel C. L. Owen, J.P., seconded the motion; and it was carried unanimously.

Water Charges in the Clayton District.—A special meeting of the Clayton District Council was held last Wednesday for the purpose of considering a revision of the water charges. Some few years ago, there was considerable loss on the water supply; and, in consequence, the charges for both domestic and trade purposes were increased. A water inspector was also appointed to supervise the plant; and, as a result of the increased charges and effective supervision, the loss has been changed to a profit, which for the last two years has amounted to £200 each year. At the meeting, it was decided to lower the charges for trade purposes to a uniform rate of 1s. 2d. instead of 1s. 4d. per 1000 gallons, with a reduction to those consuming a certain quantity, as at present. It was also decided to reduce the meter-rents 6d. per quarter, and the minimum consumptions from 5000 to 4000 gallons and from 3000 to 2000 gallons. Afterwards the rates for domestic purposes were considered, and it was moved that the charges for all houses up to and including £10 rateable value should be reduced 6d. per house per quarter. An amendment to the effect that all houses, of whatever rateable value, should be reduced 4d. per house, was, however, submitted and carried.

APPRECIATIONS.

SERIES No. 2.

The "GAS JOURNAL" said:—

"There is a clean appearance about 'Richmonds' Household Flat Iron Heating Stand that is suggestive of the cleanliness and of the delicate work that has to be performed on ironing days in many households."

No. 311. *Iron Heater on "Porcellanite" Enamelled Iron Base.*

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London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. *General Offices and Works: Warrington.*

The Shocking Affair at Hackney.—At the Bethnal Green Coroner's Court, last Thursday, an inquiry was held into the circumstances attending the death of Thomas Edward Dillon, which took place early on Sunday, the 16th inst., as recorded in the "JOURNAL" last week (p. 472). Deceased was found lying asphyxiated on a bed in his room. The gas-pipe had been severed, and all the crevices in the apartment carefully stopped up. An explosion of gas took place when the door was opened, resulting in serious injuries to three constables, as well as to Mrs. Dillon and her son-in-law. The Jury returned a verdict of "Suicide by gas poisoning during temporary insanity."

New Joint-Stock Companies.—The Slag and Tar Macadam Company, Limited, has been formed with a capital of £5000, in £5 shares (400 preference), to carry on the business of slag and tar macadam merchants and manufacturers, &c. The Company's offices are at Darlington. The Western Canada Coke and Bye-Products Company, Limited, has been registered with a capital of £1050, in 1000 preference shares at £1 and a like number of ordinary shares at 1s. The Isham Water Company, Limited, was registered on the 13th inst., with a capital of £5000 in £1 shares. The Company's offices are at Albion House, New Oxford Street, W.C. Under the title of A. Roux and Co., Limited, a Company has been registered with a capital of £2400, in £1 shares, to carry on the business of manufacturers of indices for gas and other meters, measuring instruments, &c. The Premier Lighting and Engineering Company, Limited, was registered last Wednesday with a capital of £3000, in 2999 ordinary shares of £1 each, and 15 deferred shares of 1s. 4d. each—offices at 4, Lloyds Avenue, E.C.

Tewkesbury Public Lighting.—At the meeting of the Tewkesbury Town Council on Monday last week, the question of the public lighting of the town was under consideration. At present gas is used; but the agreement with the Gas Company is terminable on twelve months' notice, and this was given by the Council in June last. Tenders had been invited from the Company, and also from the newly-formed Electric Light Company, for the lighting of the borough from the 1st of July. The Directors of the Gas Company expressed their willingness to light the whole of the town for a period of not less than five years at the same price and under the same conditions as at present. The Electric Light Company stated that they were willing to undertake the lighting of the streets in which their mains were now laid. The cost for Osram lamps for 4000 hours per annum would be £2 10s. a year for the supply of current. The Company regretted their inability to go to the expense of installing lamps, pillars, &c., for the price per lamp would be about £7 to £9. The Surveyor said there were 146 lamps, including six duplicates charged at 1½ each. Under the original agreement, 102 lamps cost £290, working out at £2 16s. 10½d. each, and the 44 others, charged as 48¼, cost £2 19s. 10d. each. Several members objected to the lighting of the front streets only by electricity, and said the Gas Company would raise their prices if the area were curtailed. Others refused to sanction the borrowing of money for the erection of standards. After discussion, a proposition that the existing contract with the Gas Company be renewed, was carried.

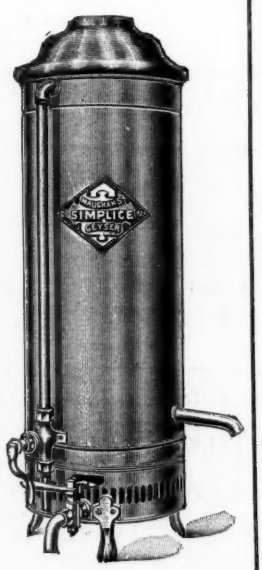
Tar-Spraying Roads in Berkshire.—At a recent meeting of the Berks County Council, it was decided to spend £250 this year on tar-spraying the roads in the county. The Council will also contribute one-third of the cost of tar-spraying by private landowners, as well as that done by villages. The Berkshire Automobile Club have agreed to give £75 for the same purpose, to be devoted chiefly to the villages; and the Reading Town Council are also spending a large sum this year on tar-spraying.

Electric Light Losses at Morecambe.—At the last meeting of the Morecambe Town Council, Alderman Gardner referred to a request made that he would furnish details of a scheme to produce electric current at 1½d. per unit, and said he had worked out a scheme, using gas-engine power, and his figures had been confirmed by two of the best firms in the country. He expressed the hope that the question would be taken up seriously by the Council, because it was high time the leakage was stopped. They had lost £12,597 within six years; and last year their loss was £2716, or more than £52 a week.

Water-Works Profits at Leeds.—The accounts of the water undertaking of the Leeds Corporation for the year ended the 31st of March last were presented at a meeting of the Water Committee on Friday. They showed a profit of £14,021, compared with £19,930 for the year 1907-8—a decrease of £5969. It is proposed to place £5000 to the reserve fund, and devote the rest to the relief of the rates. Last year the whole of the surplus went to the rates. The amounts received from water charges totalled £151,822, compared with £152,522 in 1907. The total income was £162,287, and the working expenditure £42,554, including £14,114 for rates. Out of the £119,733 gross profit, interest on loans claimed £91,605, and after other items of this character had been met, a net profit of £50,338 remained. Of this sum, £33,970 was placed to the redemption fund, and £2347 contributed to capital in respect of the Washburn main.

South African Lighting Association, Limited.—In submitting to the shareholders the accounts of the Company for the past year, the Directors express their regret at being unable to report any improvement in the position of affairs in Cape Colony. While the number of consumers has been again increased, the sale of gas shows a further falling off, due partly to the competition of electric light, and partly to the state of trade. The Directors are advised that the electrical undertaking in Port Elizabeth is carried on at a substantial loss. But its competition has nevertheless to be faced by the Association; and to this end every endeavour has been made by the Directors and officials to reduce the cost of working. Manufacturing results have been improved, and cheaper coal has assisted to maintain the profits in spite of loss of business. At Grahamstown, there was an increase of 5·66 per cent. in the sale of gas last year; and at both stations the works and plant were thoroughly maintained. The balance of profit is £203 more than in 1907. The Directors recommend the payment of a dividend of 10 per cent. for the year. This will absorb £5333, and leave £614 to be carried forward.

Geysers for Hire.



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MAUGHAN'S "SIMPLICE" GEYSERS,

Besides being exceedingly Durable, they are so made that the few wearing parts can be replaced *in Situ* at a very Low Cost.

Low Price + Low Maintenance Charge = Low Hire Rates = Popularity = Increased Gas Consumption.

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WHERE ALL PATTERNS MAY BE INSPECTED.

Tarred Roads in East Sussex.—In connection with the discussion on the dust nuisance on public highways, it is stated by the Secretary of the Royal Automobile Club that the County Surveyor of East Sussex proposes to tar nearly 80 miles of main roads and about 20 miles of other roads. The roads to be treated include those from Crawley to Brighton, East Grinstead to Eastbourne, and Tunbridge Wells to Hastings.

A Doctor's Testimony to Gas for the Eyesight.—An Eastbourne doctor has written as follows to the Secretary of the Eastbourne Gas Company: "I do much prefer gas-light with good mantles to electric light, as I firmly believe the former is much more helpful to one's eyesight on account of the light being more diffused than is the case with the electric light. And for this reason I have always told my patients, and especially those who read or write much by the aid of artificial light, that they will not only materially save their eyesight, but that they will derive more pleasure in reading and writing."

The Hastings Gas Company and the Current Rate.—Last Thursday, application was made to the Hastings Magistrates by Mr. F. W. Coles, on behalf of the Hastings and St. Leonards Gas Company, with regard to the current rate. He said the Corporation had included in the estimate certain items which the Company objected to; and they served the Corporation with a notice of appeal to the next Quarter Sessions. The Company accordingly entered into recognizances to prosecute the appeal. He was happy, however, to say that arrangements had been come to. The items objected to had now been excluded from the rate, and the Corporation had paid the Company's costs. His application was to release the Company from their recognizances. The Town Clerk (Mr. B. F. Meadows) agreed to this course being adopted; and the Mayor said the Bench were very glad to grant the application.

Through Electrical Spectacles.—"Apparently," says the "Electrical Review," "as the result of its experimenting, the Bradford City Council has decided to retain the public gas lighting in Manningham Lane; and, we might add, to retain its reputation as one of the worst-lighted cities in the country." There is a little confusion between pronouns and nouns in the sentence; but that does not matter so long as we gather our contemporary's meaning.

Water-Rates in London.—At the meeting of the Metropolitan Water Board last Friday, the Finance Committee reported that they had had before them a report by the Accountant (Mr. A. Newton) showing in detail the result of the collection of water-rates for the half year ended March 31 last; this collection covering the second half-year's working of the new Charges Act. The arrears of water-rates for domestic supply and fixed charges at the above-named date were £47,800, compared with £106,298 at the close of the first half year—viz., at Sept. 30 last—a reduction of £58,498 in the amount uncollected. In a similar way the arrears in respect of meter supplies had been reduced by no less than £57,000. The Committee pointed out that a very large proportion of the arrears was outside the control of the collecting officers; and they thought the result of the collection was very satisfactory, and reflected credit upon the officers concerned.

We have received from the British Mannesmann Tube Company, Limited, of Salisbury House, London Wall, E.C., copies of their latest booklets dealing with weldless steel spigot and faucet tubes. One of these consists of a large number of very interesting testimonials from gas and water engineers, and others, as to the advantages and the economies connected with the use of these tubes; while the other contains illustrations, descriptive matter, particulars of tests, lists of places to which the tubes have been supplied, &c.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GAS ENGINEER AND MANAGER. Bolton Gas Department. Applications by June 14.
MANAGER. Maryport Urban District Council. Applications by June 2.
GAS MANAGER (FIFESHIRE). Applications by June 7 to J. Dishart, Edinburgh
TEACHER IN GAS SUPPLY. Tottenham Polytechnic. Applications by June 7.
DISTRICT SUPERINTENDENT. No. 5097.
GAS FITTING, STOVES, &C., SALESMAN. Torquay Gas Company. Applications by June 2.
SHOW-ROOM SALESMAN. Belfast Gas Department. Applications by May 28.
WATER-RATE COLLECTOR. Maidstone Water Company. Applications by June 3.

Situations Wanted.

SECRETARY, MANAGER, OR ACCOUNTANT. W. B. Mimmack, St. Paul's Cray.
SULPHATE, LEADWORK, &C. 117, Galloway Road, Shepherd's Bush.

Books, &c., Wanted.

"JOURNALS." Mr. Maurice Graham, 115, Ashley Gardens, London, S.W.
KING'S TREATISE. R. C. Annandale, Hull.

Plant, &c. (Second-Hand), for Sale.

COMPLETE GAS-WORKS. Northleach Gas Company.
GAS-COOKERS. Coventry Gas Department.
PURIFIERS, &C. Sutton Gas Company.
SCRUBBER AND WASHER, &C. Barnet Gas and Water Company.
STATION METER. Solihull Gas-Works.
SULPHATE STILLS. High Wycombe Gas Company.

Plant, &c. (Second-Hand), Wanted.

LIVESEY WASHER. No. 5098.

Meeting.

MALTA AND MEDITERRANEAN GAS COMPANY. London Offices. June 4. Twelve o'clock.

Stocks and Shares.

BEXHILL WATER AND GAS COMPANY. June 9.
BRISTOL GAS COMPANY. June 17.
EAST HULL GAS COMPANY. June 2.
HARROW AND STANMORE GAS COMPANY. June 17.
SOUTHEND WATER COMPANY. June 9.
YARMOUTH WATER COMPANY. June 9.

TENDERS FOR

Benzol.

WARRINGTON GAS DEPARTMENT. Tenders by May 31.

Carbon.

BISHOPS STORTFORD GAS COMPANY.

Coal and Cannel.

BARNOLDSWICK GAS AND WATER DEPARTMENT. Tenders by June 1.
BARROW-IN-FURNESS CORPORATION. Tenders by June 8.
CIRENCESTER GAS COMPANY. Tenders by May 31.
DEVONPORT GAS DEPARTMENT. Tenders by June 12.
DONCASTER GAS COMMITTEE. Tenders by June 11.
ELSECAR, &C., GAS COMPANY. Tenders by June 2.
GAINSBOROUGH GAS DEPARTMENT. Tenders by May 31.
GLOUCESTER GASLIGHT COMPANY. Tenders by June 1.
HALIFAX GAS DEPARTMENT. Tenders by June 4.
HORNCASTLE GAS DEPARTMENT. Tenders by June 5.
LURGAN GAS COMPANY. Tenders by June 7.
MORECAMBE GAS DEPARTMENT. Tenders by May 31.
PENRITH GAS DEPARTMENT. Tenders by June 2.
PETERBOROUGH GAS COMPANY. Tenders by June 7.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by June 3.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 7.
VARIOUS WORKS. Tenders to Mr. Joseph Reeds, Matlock Bath, by June 0.
WARRINGTON GAS DEPARTMENT. Tenders by May 31.

Cookers.

WARRINGTON GAS DEPARTMENT. Tenders by May 31.

Coke.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 7.

Fire-Clay Goods.

WARRINGTON GAS DEPARTMENT. Tenders by May 31.

General Stores—

(Bags, Bolts and Nuts, Brass and Copper Tubing, Fittings, &c, Ironmongery, Cement, Castings, Bricks, Flexible Tubing, Glass, Iron and Steel, Lead and Compo. Pipe, Lime, Oils, Paints, &c., Rails, &c., Drysalteries, Sulphuric Acid, Taps and Valves, &c.)
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 7.
WARRINGTON GAS DEPARTMENT. Tenders by May 31.

Lamps.

WARRINGTON GAS DEPARTMENT. Tenders by May 31.

Meters.

WARRINGTON GAS DEPARTMENT. Tenders by May 31.

Oil for Gas Manufacture.

BARROW-IN-FURNESS CORPORATION. Tenders by June 8.

Pipes, &c.

RHONDDA GAS AND WATER DEPARTMENT. Tenders by June 3.
WARRINGTON GAS DEPARTMENT. Tenders by May 31

Purifiers, Scrubber, and Condensers.

WINSFORD GAS DEPARTMENT. Tenders by June 14.

Tar and Liquor.

DONCASTER GAS DEPARTMENT. Tenders by June 11.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 7.

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For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

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OLD BROAD STREET, LONDON, E.C.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
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